

EXHIBIT

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**Update to the Assessment of
Contracting Outcomes for Small Disadvantaged
Businesses**

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Abstract

My name is Daniel Chow, and I currently serve as a Senior Economist in the Office of Policy Analysis and Development (OPAD) of the Minority Business Development Agency (MBDA) at the Department of Commerce. OPAD is the research program of the MBDA, which produces analyses related to programs that support minority business enterprises (MBEs). A copy of my CV is attached to this report (Attachment 1).

This expert report was prepared for the Department of Justice in conjunction with its representation of the Small Business Administration and the United States Department of Agriculture in the matter of *Ultima Servs. Corp. v. U.S. Dep't. of Agric.*, No. 2:20-cv-00041 (E.D. Tenn.).¹ The Department of Justice asked me to review data on government contracting to assess the relationship between contracting outcomes for small businesses and the type of ownership of the businesses. This study focuses on federal contracting and the probability of certain classifiable businesses' attainment of federal contracts in a specific period, including minority-owned businesses and small disadvantaged businesses (including businesses that participate in the Small Business Administration's Section 8(a) business development program). I have not been compensated beyond my government salary for this report.

My analysis is modeled after an original study conducted in 2012 by Robert N. Rubinovitz, Ph.D., the former Deputy Chief Economist at the U.S. Department of Commerce, Economics and Statistics Administration.² In that study, Dr. Rubinovitz analyzed data on government contracts for small businesses for FY 2012 and looked at whether firms that were "small disadvantaged businesses" (SDBs) were more or less likely to win federal prime contracts relative to other small businesses, holding constant various factors that might influence the award of a contract.³ The study found the odds of winning contracts for SDBs not participating in the Small Business Administration's (SBA) 8(a) business development program are estimated to be roughly 11 percent lower relative to the odds of winning contracts by firms that were not identified as SDBs.⁴ The difference was statistically significant at the 95 percent significance level. Minority-owned firms (which include minority-owned small businesses, SDBs that are minority-owned and minority-owned 8(a) participants) had roughly 30 percent lower odds of winning a contract than other small firms.

In 2013, Dr. Rubinovitz provided a subsequent analysis in the *Rothe Development, Inc. v. Department of Defense* case.⁵ Using an identical method as in his original 2012 study, the subsequent analysis looked at the relationship between contracting outcomes for non-8(a) minority-owned SDBs compared to all other

¹ The views expressed in this expert report do not necessarily represent the views of the Department of Commerce, the Minority Business Development Agency, or the United States.

² See Report of Robert N. Rubinovitz at 2, *Rothe Dev., Inc. v. Dep't of Defense, et al.*, No. 1:12-cv-00744-KBJ (D.D.C. Jan. 31, 2014), ECF No. 45-2 (hereinafter "Rubinovitz Report"), a copy of which is attached to this report (Attachment 2).

³ SDBs are defined as (1) businesses that are 51% or more owned and controlled by one or more disadvantaged persons; (2) the disadvantaged person or persons must be socially disadvantaged and economically disadvantaged; and (3) the firm must be small, according to SBA's size standards. See SBA SDB Definitions, available at <http://www.sba.gov/contracting/government-contracting-programs/small-disadvantaged-businesses>. As shown in Table 1 below, the vast majority of SDBs during the time period relevant to this study are minority-owned.

⁴ Some SDBs may be eligible to participate in the SBA's 8(a) Business Development program, which is for certain small businesses that are at least 51% owned and controlled by U.S. citizens who are socially and economically disadvantaged. See SBA 8(a) Business Development program, available at <https://www.sba.gov/federal-contracting/contracting-assistance-programs/8a-business-development-program>. The complete eligibility criteria for the 8(a) program are set out in Title 13 Part 124 of the Code of Federal Regulations.

⁵ See Rubinovitz Supplemental Report, *Rothe Dev., Inc. v. Dep't of Defense, et al.*, No. 1:12-cv-00744-KBJ (D.D.C. June 16, 2014), ECF No. 64-11.

small businesses. He found that, in virtually all cases, on an industry-by-industry basis, the odds of non-8(a) minority-owned SDBs winning contracts, all other factors being equal (size, age, legal organization, level of government clearance), were lower than the odds of other small firms winning contracts, to a statistically significant degree.

Following the methodology utilized by Rubinovitz in his 2012 study, I studied data on government contracts for small businesses and factors that might influence the award of a contract to determine whether SDBs were more or less likely to win federal prime contracts relative to other small businesses. Using data from April 2019 to August 2020, I considered the impact on the “odds ratio” of small firms winning contracts, holding other factors constant.

My analysis of the data found that the odds of winning contracts for SDBs not participating in the 8(a) business development program are estimated to be roughly 37 percent lower relative to the odds of winning contracts by firms that were not identified as SDBs. The difference was statistically significant at the 95 percent significance level. Minority-owned firms (which include minority-owned small businesses, SDBs that are minority-owned, and minority-owned 8(a) participants) had roughly 15 percent lower odds of winning a contract than other small firms.

Methodology

The Rubinovitz study constructed a database of firms that were reasonably expected to compete for federal contracts, along with information on which of these firms won contract awards, firm characteristics, and whether firm owners belonged to a specially identified group for which the federal government has contracting goals. The SBA provided data on firms in its 8(a) and/or HUBZone⁶ programs and which were matched to the Federal Procurement Data System (FPDS). In addition, the Rubinovitz study obtained from Bloomberg Government an extract of FPDS data for contracts covered by federal contracting goals for specially defined groups. These sources provided data elements about the form of organization, contract awards, level of security clearance, registration dates, SDB status, industry, race and ethnicity of the registrant (or with which the registrant is affiliated), and ownership type (minority, woman, service-disabled veteran, or other veteran).

Rubinovitz used the logit model of regression to analyze the odds of an event occurring, in this case the odds of being awarded a federal contract. A logit model of regression estimates the relationship between a variable to be explained (the “dependent” variable) and one or more explanatory variables (the “independent” variables). The resulting estimated relationship between the dependent and independent variables is called the odds ratio, which is expressed by the general logit model: $Y = \exp(\beta * X + \varepsilon)$. As expressed in this model, Y is the dependent variable; X is one or more independent variable(s) that might explain Y ; β is the unknown parameter(s) to be estimated (which measures the degree to which the independent variable(s) is related to the dependent variable); ε is the error term (which represents statistical “noise” of other elements that influence the dependent variable); and $\exp^{(\cdot)}$ is the exponential function. The model was run to obtain estimated odds ratios for winning contract awards in various industries and for a number of different variables.

As in the Rubinovitz study, the independent variables I use are the ownership of the firm (minority-owned, women-owned, and veteran-owned); the type of organization (whether the firm is a corporation, a

⁶ SBA’s HUBZone program provides federal contracting assistance for qualified small businesses located in historically underutilized business zones in an effort to increase employment opportunities, investment, and economic development in such areas. See SBA’s HUBZone Program, available at <https://www.sba.gov/federal-contracting/contracting-assistance-programs/hubzone-program>. The complete eligibility criteria for the HUBZone program are set out in Title 13 Part 126 of the Code of Federal Regulations.

partnership, or some other type); other firm characteristics (size, in terms of numbers of employees and revenues, level of security clearance of the firm, and firm age); and whether the firm identifies itself as a SDB and if so, whether the firm is part of the SBA's 8(a) program.

This study follows, to the maximum extent possible, the same methodology and techniques used in Rubinovitz's 2012 analysis. However, my analysis encountered some changed circumstances since Rubinovitz completed his study nine years ago, such as changes in agency data collection and data availability, as well as my independent efforts. This study also uses more updated statistical programming codes that were developed after the Rubinovitz analysis.

Key Elements in the Present Study

Data Availability

Data provided by the SBA originated from the System for Award Management (SAM) for registered companies containing firm-level information such as size, employment, location, dates of operation, industry, and Dunn and Bradstreet data universal numbering system (DUNS) numbers. SBA also provided two datasets from the Federal Procurement Data System (FPDS) for contract awards: one each for small businesses and for non-small businesses. Both the small and non-small business files contain information about business type, organizational type, ownership, dollars awarded, SDB status, and DUNS numbers. The data for registrants and awards were extracted for firms registered in SAM, or that had recorded transactions, from April 2019 to August 2020.

From the original raw datasets, I compiled a list of relevant variables from both SAM registrants' data (7,466,447 observations and 42 variables) and FPDS awards (5,104,224 observations and 55 variables).

SAM registrant data contains reported six-digit North American Industry Classification System (NAICS)⁷ codes and DUNS numbers. Size standards were based on the parent company's six-digit NAICS code as reported in the SAM database. Each company was designated as "small" in each industry if it was small in any of its corresponding six-digit NAICS codes.⁸ Firms were designated "not small" if they were not flagged as small in their six-digit NAICS codes. As in the Rubinovitz study, industry-level comparisons were at the three-digit NAICS level.⁹ Unique observations for SAM registrants were identified by DUNS number and collapsed by three-digit NAICS code. A given DUNS number may have more than one NAICS code, indicating a firm may register in SAM to compete in one or more industries. Merging and removal of redundant and extraneous observations by DUNS number resulted in a combined file of 5,659,740 registration observations and 64 variables.

Bloomberg Government data, utilized in the Rubinovitz study, were not needed here because the FPDS datasets provided by SBA included the necessary obligations amounts, contract details, three-digit NAICS codes, and business characteristics. For Official Use Only (FOUO) and Freedom of Information Act (FOIA) data were not needed because SBA datasets have the necessary 8(a) and HUBZone (also by

⁷ NAICS is a numbering system developed for use by statistical agencies for the collection, analysis, and publication of statistical data related to the U.S. economy. NAICS codes classify business establishments by type of economic activity, process, or production. A NAICS code indicates aggregation levels by the number of digits (2 digit Sector, 3 digit Subsector, 4 digit Industry Group, 5 digit Industry, and 6 digit National Industry).

⁸ Size standards vary by industry and are generally based on the number of employees or the amount of annual receipts the business has. See <https://www.sba.gov/federal-contracting/contracting-guide/size-standards>.

⁹ As noted in the Rubinovitz Report, as more digits are added to the code, the industry classifications become more narrowly defined and data become sparser. Using three-digit NAICS codes provides a compromise between having sufficient data in each industry grouping with the recognition that firms can switch production within the broader three-digit category. See Rubinovitz Report at 4.

DUNS number) identifiers to indicate participating firms in these programs. A separate list of excluded firms was also not necessary because firms excluded from doing business with the federal government were flagged in the SAM dataset and dropped from the analysis.

As in the prior method used by Rubinovitz, I accounted for firms' expiration and renewal dates for registration in SAM. Unlike the previous study, which covered a single fiscal year, here the expirations/renewals spanned portions of two fiscal years, FY2019 and FY2020, as I included firms that were registered in SAM between April 2019 and August 2020. The maximum value of continuous variables was chosen if a firm belonged to a particular group in either year.

Several NAICS industry groups were excluded from the Rubinovitz study because of incomplete data, irrelevance, or because data issues in a given NAICS code prevented the regression model from producing reliable estimates. Among those, three industries were not included in this study for the reasons explained in Table 2: 521 (Monetary Authorities-Central Bank), 814 (Private Households), and 921-928 (Public Administration). The balance of industry groups that were excluded from the prior study were eligible for inclusion in this update because they had one or more non-8(a) SDB firm(s) winning a contract (see Table 2 for these re-included industries).

Table 1 summarizes the owner characteristics of the 32,038 recorded SDBs used in this study. About 88% of SDB owners are self-identified as minority, with roughly equal percentages as non-minority female and non-minority male.

Table 1
Owner Characteristics Among All Small Disadvantaged Businesses

	Number of SDBs	Percent of SDBs
Grand Total	32,038	100.0%
Total Minority*	28,325	88.4%
Black	7,573	23.6%
Hispanic	3,138	9.8%
Asian Pacific	8,623	26.9%
American Indian or Alaska Native	4,490	14.0%
Asian Subcontinent	3,135	9.8%
Not classified	1,366	4.3%
Non-Minority Female-Owned	1,877	5.9%
Non-Minority Male-Owned	1,836	5.7%
Non-Minority Male-Owned in Other Special Categories**	404	1.3%
Non-Minority Male-Owned not in Other Special Categories	1,432	4.5%

*Minority categories may overlap.

**Firms in Other Special Categories are those located in HUBZones, Service Disabled Veteran-Owned, or Other Veteran-Owned

Table 2
Three-digit NAICS Codes Not Included In Analysis:*

<u>Code</u>	<u>Description</u>	<u>Reason Dropped</u>
521	Monetary Authorities-Central Bank	This industry only consists of one entity—the Federal Reserve System
814	Private Households	No SBA small business definition
921-928	Public Administration	No SBA small business definition

* The re-included industries in this study are: 221 Utilities, 482 Rail Transportation, 486 Pipeline Transportation, 487 Scenic Sightseeing Transportation, 491 Postal Service, 522 Credit Intermediation, 525 Funds, Trusts, and Other Financial Vehicles, 533 Lessors of Nonfinancial Intangible Assets, and 551 Management of Companies and Enterprises.

Regressions

As noted in the Rubinovitz study, because some degree of error exists in regression models, it is necessary to measure the degree of uncertainty between the dependent and independent variables and whether their relationships are statistically significant or not. In the logit regression, which analyzes probabilities rather than continuous values, a statistically significant¹⁰ estimate is one in which the odds ratio is different from the value 1.0. At 1.0, the odds ratio for winning is essentially equal between, for example, a non-8(a) SDB and an 8(a) SDB. An estimate that is not statistically significant indicates the odds ratio cannot be distinguished as being different from the odds of winning a contract with another variable.

Regression analysis using the logit model, plus a variant procedure applied in the previous study called firthlogit, produced odds ratios in similar manner as the original study when using the more recent data. Firthlogit is a variant of the logit model that mitigates problematic situations in which an independent variable is perfectly associated with only one outcome value of the dependent variable.¹¹ Firthlogit adjusts for possible estimation biases for industries that have a very low contract win rate and in cases where winning or not winning a contract is perfectly or nearly perfectly equal to a linear function of one of the control variables (for example, in industries where no women-owned businesses won any contracts). The firthlogit method minimizes the generation of the extremely large standard errors or highly inflated coefficients that might occur from these perfectly associated relationships during logistic regression estimation.

Pseudo R-squared results are not reported because the firthlogit procedure used in this updated study does not produce them.¹² Pseudo R-squared methodologies vary widely for different purposes. The Pseudo R-squared is one class of R-squared statistics which are measures of the proportion of variance for a dependent variable that is explained by the independent variable(s) in a regression. R-squared values do not measure model adequacy and higher or lower values alone do not fully measure the fit of the model and data. The presence or lack of a Pseudo R-squared or an R-squared does not alter the accuracy or validity of regression results.

¹⁰ The statistical significance of odds ratios is determined by calculating their p-values. A p-value is a test for whether a coefficient is equal to zero or not equal to zero. A low p-value (less than or equal to 0.5) indicates the coefficient is not equal to zero and so a statistically significant relationship exists between the response and predictor variable(s). A high p-value (greater than 0.5) indicates changes in the predictor(s) are not associated with changes in the response variable, and are not statistically significant.

¹¹ See Firth, D. 1993, "Bias reduction of maximum likelihood estimates." *Biometrika* 80:27-38; Heinze, G. and Schemper, M. 2002, "A solution to the problem of separation in logistic regression," *Statistics in Medicine* 21:2409-19. I used the firthlogit Stata module written by Joseph Coveney to make these estimates.
(<http://econpapers.repec.org/software/bocbocode/s456948.htm>).

¹² R-squared is an equation that measures the proportion of the total percentage of variance attributed to all the independent variables. An R² value is between 0 (the regression model does not explain any variation in the dependent variable) and 1 (the regression model explains all the variation in the dependent variable).

Overview of Results

As in the prior study, the ultimate question of interest is whether the data show differences in the odds of contracts being won by minority-owned small businesses, especially those identified as SDBs and those participating in the 8(a) program, compared to other small businesses. I used the logit regression analysis that was implemented in the earlier study to produce odds ratios for the same set of independent variables. The odds ratio is the estimated relationship between the dependent variable (whether a firm wins or does not win a contract) and the independent variables (such as ownership type, type of organization, and firm characteristics).

Table 3 shows that woman-owned, minority-owned, and other veteran-owned firms have lower odds than other firms to win a contract, all else being equal. Most of the standard errors (17 out of 18) in Table 3 are small relative to their estimated odds ratios. The odds of winning a contract for SDBs who do not participate in the 8(a) program is about 37 percent less than for other firms, and this result is statistically significant. Firms in the 8(a) program, in a certified HUBZone, or owned by service-disabled veterans have statistically significant and larger odds of winning a contract. The firm size and age ratios favor the larger and older firms, reflecting their greater likelihood at competing for and thus winning contracts. Among ownership types, partnership, corporate not-tax exempt, and corporate tax-exempt firms had lower odds and were statistically significant. Sole proprietorship was the only group that had odds that were not statistically significant. The type of security clearance held by a firm had a strong positive effect on the firm's odds of winning a contract, which is understandable because clearances are often prerequisites for competing for many types of government contracts.

Table 4 summarizes the results when the same model is estimated separately for each three-digit NAICS code (Table 5 is a more detailed list of the industry estimates and Table 6 defines the NAICS codes used in Table 5). In about 90% of industries, accounting for over 99% of contracts, non-8(a) SDB firms' odds of winning contracts are lower, all else equal, than other firms. In 50% of industries, representing over 93% of contracts, the odds of winning are statistically significantly lower.

Table 4a shows the same information for minority-owned firms. Minority-owned firms' odds of winning contracts are lower in about 67% of industries, representing over 50% of contracts. In about a quarter (23.6%) of industries, the odds of winning are statistically significantly lower, accounting for 16.8% of contracts.

One reason that industry regressions might change categories from the Rubinovitz study relates to sample size. The number of observations¹³ is a key factor in the size of a standard error, which is used in determining if an estimate is considered to be sufficiently precise to be considered statistically significant.¹⁴ With the large number of observations in this study, the data very likely reflects the odds of winning.

¹³ The Rubinovitz study had a total of 765,163 industry observations compared to the current study of 1,171,497 industry observations.

¹⁴ Statistical significance occurs when the point estimate of the odds ratio, plus or minus the standard errors, are sufficiently far from one. The formula for computing standard errors is inversely proportional to the square root of the number of observations, which means that there is a direct inverse relationship between a larger number of observations and smaller standard errors. Also note that the closer the point estimate of the odds ratio is to one, the smaller the standard errors need to be for the range defined by the point estimate and standard errors to not include one.

One way to see this relationship is to split the industry regression into groups by the number of observations in that industry regression. In Table 5, there are 31 three-digit NAICS code industries with at least 9,000 observations (and up to 177,411 observations). In 27 of these 31 industries with a larger sample size, the estimate for the odds ratios of SDBs is statistically significant (the estimates range between 0.326 and 0.803 and have p-values between 0 and 0.019). Among the industry regressions with smaller sample sizes, there are 17 three-digit NAICS code industries with fewer than 2,000 observations, and in only one of these is the odds ratio on the SDB variable statistically significant (p-value of 0.011, and the estimate of the odds ratio is less than 0.5).

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Table 3
Pooled Regression Results

	Odds Ratios
SDB not 8(a)	0.632*** (0.0100)
8(a)	2.606*** (0.1013)
woman-owned	0.899*** (0.0147)
minority-owned	0.858*** (0.0163)
hubzone	1.746*** (0.0662)
service-disabled veteran	1.215*** (0.0320)
other veteran	0.902*** (0.0242)
log age	1.167*** (0.0085)
log employment	1.037*** (0.0045)
log receipts	1.055*** (0.0028)
sole proprietor (omitted: "other" orgs)	1.030 (0.0318)
partnership	0.753*** (0.0237)
corporate not tax-exempt	0.820*** (0.0217)
corporate tax-exempt	0.530*** (0.1166)
government non-classified	1.630*** (0.0310)
government confidential	1.993*** (0.1011)
government secret	1.841*** (0.0590)
government top secret	2.186*** (0.0591)
constant	0.00229*** (0.0001)
No. Observations	504,819

Standard errors in parentheses: (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$

Table 4

Summary Results from Industry Regressions: Difference in Odds of Non-8(a) SDB's* Winning Contracts

	Contracts		Awards		Industries	
Lower odds statistically significant	278,492	93.6%	\$47,513,256,560	91.6%	45	50.6%
Lower odds not statistically significant	17,790	6.0%	\$4,250,817,536	8.2%	35	39.3%
Higher odds statistically significant	0	0.0%	\$0	0.0%	0	0.0%
Higher odds not statistically significant	1,253	0.4%	\$112,927,496	0.2%	9	10.1%
Totals	297,535	100.0%	\$51,877,001,592	100.0%	89	100.0%
*SDBs are counted once for each industry in which they are registered or won contracts. Percents may not sum to 100% due to rounding.						

Table 4a

Summary Results from Industry Regressions: Difference in Odds of Minority-Owned Businesses* Winning Contracts

	Contracts		Awards		Industries	
Lower odds statistically significant	50,249	16.9%	\$18,453,358,912	35.6%	21	23.6%
Lower odds not statistically significant	103,510	34.8%	\$19,657,230,336	37.9%	39	43.8%
Higher odds statistically significant	21,195	7.1%	\$8,289,815,552	16.0%	1	1.1%
Higher odds not statistically significant	122,581	41.2%	\$5,476,597,760	10.6%	28	31.5%
Totals	297,535	100.0%	\$51,877,002,560	100.0%	89	100.0%
*Minority Owned Businesses are counted once for each industry in which they are registered or won contracts. Percents may not sum to 100% due to rounding.						

Table 5: Industry Specific Regression Results

	111	112	113	114	115	211	212	213	221	236	237
SDB not 8(a)	0.933 (0.835)	0.601 (0.257)	0.637 (0.311)	0.648 (0.459)	0.690*** (0.000)	0.778 (0.832)	0.936 (0.000)	0.180*** (0.000)	0.506*** (0.000)	0.740*** (0.000)	0.781*** (0.006)
8(a)	5.515 (0.116)	1.907 (0.705)	2.825 (0.236)	0.405 (0.630)	0.636 (0.144)	583.2* (0.056)	1.939 (0.280)	0.225* (0.096)	0.498* (0.098)	5.340*** (0.000)	3.748*** (0.000)
woman-owned	0.472 (0.117)	1.255 (0.619)	0.748 (0.580)	0.731 (0.619)	0.748*** (0.004)	2.956 (0.208)	0.867 (0.661)	2.299*** (0.002)	0.945 (0.760)	1.233** (0.015)	0.878 (0.174)
minority-owned	0.372* (0.100)	0.733 (0.610)	2.227 (0.115)	1.100 (0.894)	0.696*** (0.005)	0.712 (0.848)	0.680 (0.283)	1.730* (0.095)	0.926 (0.704)	0.868 (0.134)	0.494*** (0.000)
hubzone	1.432 (0.721)	1.085 (0.956)	0.771 (0.716)	8.519* (0.083)	1.766*** (0.000)	3.125 (0.497)	1.507 (0.271)	0.908 (0.871)	1.253 (0.459)	2.076*** (0.000)	2.887*** (0.000)
service-disabled veteran	0.916 (0.898)	0.760 (0.729)	1.014 (0.987)	1.106 (0.906)	0.646** (0.021)	1.637 (0.793)	0.794 (0.651)	1.154 (0.862)	0.904 (0.538)	2.986*** (0.000)	1.381*** (0.005)
other veteran	0.141 (0.171)	0.199 (0.388)	0.290 (0.388)	0.363 (0.517)	0.670** (0.022)	3.196 (0.499)	0.397 (0.268)	0.850 (0.748)	0.748 (0.394)	1.174 (0.342)	0.946 (0.747)
log age	1.513** (0.017)	0.990 (0.961)	1.698** (0.027)	0.672 (0.177)	1.371*** (0.000)	2.658 (0.118)	1.209 (0.209)	1.258 (0.133)	1.008 (0.915)	1.240*** (0.000)	1.171*** (0.001)
log employment	0.852* (0.055)	1.200* (0.064)	1.279* (0.076)	1.086 (0.754)	0.896*** (0.000)	0.506 (0.102)	0.812* (0.061)	1.063 (0.535)	0.919*** (0.000)	0.519*** (0.007)	0.893*** (0.000)
log receipts	1.079 (0.204)	0.976 (0.647)	0.913* (0.054)	1.774*** (0.006)	1.032** (0.028)	1.320 (0.256)	1.073 (0.229)	1.099 (0.153)	1.203*** (0.000)	1.176*** (0.008)	1.045*** (0.008)
sole proprietorship (omitted: "other" orgs)	0.538 (0.998)	0.884 (0.946)	1.106 (0.828)	0.570 (0.270)	0.817 (0.595)	0.0330* (0.104)	0.531 (0.405)	0.465 (0.865)	0.724 (0.592)	0.536*** (0.003)	0.552*** (0.048)
partnership	0.332 (0.332)	0.867 (0.867)	0.900 (0.900)	0.789 (0.789)	0.246 (0.246)	0.067 (0.067)	0.235 (0.235)	0.134 (0.134)	0.286 (0.286)	0.000 (0.000)	0.664*** (0.000)
corporate not tax-exempt	0.703 (0.540)	0.684 (0.577)	0.965 (0.958)	5.073 (0.278)	0.914 (0.540)	0.0228** (0.027)	0.600 (0.207)	0.545 (0.120)	0.755 (0.262)	0.646*** (0.000)	0.664*** (0.002)
corporate tax-exempt	5.318 (0.307)	13.130 (0.154)	6.983 (0.275)	44.38* (0.094)	0.635 (0.760)	0.000 (0.000)	2.071 (0.648)	4.278 (0.370)	2.008 (0.641)	0.0450* (0.030)	0.0940* (0.099)
government non-classified (omitted: no security reported)	1.233 (0.754)	1.135 (0.879)	0.945 (0.935)	7.435*** (0.001)	0.969 (0.840)	2.165 (0.496)	0.784 (0.592)	2.558*** (0.001)	1.016 (0.940)	1.579*** (0.000)	1.132 (0.247)
government confidential	5.079 (0.277)	2.740 (0.492)	2.579 (0.537)	8.195** (0.021)	0.997 (0.996)	140.100 (0.153)	1.681 (0.545)	2.420 (0.204)	3.219*** (0.001)	2.269*** (0.000)	0.860 (0.671)
government secret	0.391 (0.525)	5.725* (0.082)	0.454 (0.595)	3.214 (0.296)	0.202* (0.054)	0.446 (0.723)	0.898 (0.941)	0.278 (0.373)	0.869 (0.773)	1.671*** (0.002)	1.094 (0.693)
government top secret	1.249 (0.810)	6.591* (0.064)	0.455 (0.599)	8.526 (0.299)	0.993 (0.989)	0.819 (0.902)	4.048 (0.131)	1.824 (0.334)	1.585 (0.120)	1.241 (0.190)	0.505** (0.032)
Constant	0.000627*** (0.00000)	0.0150*** (0.00019)	0.000328*** (0.00000)	3.97e-08*** (0.00000)	0.0187*** (0.00000)	0.03520 (0.22100)	0.0130*** (0.00011)	0.000151*** (0.00000)	0.00361*** (0.00000)	0.000182*** (0.00000)	0.00284*** (0.00000)
Observations	3,771	2,444	2,894	734	8,969	198	3,384	4,296	13,160	41,199	35,596

Table 5: Industry Specific Regression Results

	238	311	312	313	314	315	316	321	322	323	324
SDB not 8(a)	0.704*** (0.000)	0.819 (0.185)	0.474 (0.208)	0.564** (0.012)	0.575*** (0.000)	0.543*** (0.000)	0.899 (0.779)	0.695 (0.118)	0.782 (0.220)	0.419*** (0.001)	0.753 (0.192)
8(a)	3.927*** (0.000)	0.269 (0.370)	7.552* (0.087)	0.301 (0.189)	0.662 (0.244)	0.548 (0.198)	3.006 (0.227)	0.678 (0.584)	0.415 (0.309)	0.386 (0.294)	0.429 (0.123)
woman-owned	1.011 (0.843)	0.554*** (0.001)	2.055 (0.185)	1.121 (0.199)	0.996 (0.977)	0.851 (0.305)	0.840 (0.579)	1.090 (0.710)	1.110 (0.632)	0.743 (0.196)	0.868 (0.528)
minority-owned	0.680*** (0.000)	0.651** (0.020)	0.323* (0.085)	0.835 (0.485)	0.987 (0.938)	0.861 (0.428)	0.547 (0.233)	0.525** (0.045)	0.677* (0.090)	1.082 (0.781)	1.110 (0.657)
hubzone	1.866*** (0.000)	2.773*** (0.002)	11.64*** (0.001)	2.365*** (0.006)	1.071 (0.776)	2.086*** (0.004)	0.988 (0.984)	0.837 (0.695)	1.644 (0.110)	1.380 (0.570)	0.799 (0.581)
service-disabled veteran	1.982*** (0.000)	0.713 (0.271)	0.813 (0.786)	0.566 (0.132)	1.341 (0.122)	1.099 (0.669)	0.586 (0.374)	1.438 (0.240)	1.002 (0.994)	0.716 (0.440)	0.562* (0.089)
other veteran	1.042 (0.673)	0.265*** (0.006)	1.020 (0.983)	0.749 (0.497)	0.724 (0.214)	0.658 (0.172)	0.467 (0.254)	0.974 (0.947)	1.008 (0.982)	0.436 (0.134)	0.210** (0.016)
log age	1.097*** (0.001)	0.899* (0.097)	1.196 (0.467)	1.146 (0.174)	1.001 (0.994)	1.168** (0.038)	0.988 (0.943)	1.020 (0.866)	1.003 (0.977)	1.096 (0.450)	1.052 (0.594)
log employment	1.030 (0.000)	0.826*** (0.000)	0.692** (0.013)	0.810*** (0.005)	0.975 (0.609)	0.845*** (0.002)	1.348*** (0.004)	0.677*** (0.000)	0.813*** (0.003)	0.778*** (0.007)	0.904* (0.098)
log receipts	1.064*** (0.109)	1.157*** (0.000)	0.934 (0.222)	1.159*** (0.004)	1.182*** (0.000)	1.195*** (0.000)	1.026 (0.670)	1.282*** (0.000)	1.168*** (0.000)	1.263*** (0.002)	1.080** (0.015)
sole proprietorship (omitted: "other" orgs)	0.748** (0.016)	0.422** (0.014)	0.402 (0.260)	0.568 (0.275)	0.734 (0.344)	0.421** (0.020)	0.454 (0.267)	0.747 (0.514)	0.399** (0.023)	0.316** (0.011)	1.488 (0.342)
partnership	0.823* (0.080)	0.702 (0.155)	0.257* (0.092)	0.565 (0.203)	0.574* (0.064)	0.569* (0.064)	0.361* (0.089)	0.403* (0.056)	0.404** (0.012)	0.329*** (0.006)	1.044 (0.903)
corporate not tax-exempt	0.841* (0.061)	0.681* (0.068)	0.280* (0.056)	0.741 (0.398)	0.852 (0.502)	0.608** (0.043)	0.345*** (0.021)	0.718 (0.325)	0.386*** (0.001)	0.252*** (0.000)	0.734 (0.312)
corporate tax-exempt	0.166** (0.031)	0.283 (0.459)	0.783 (0.889)	3.435 (0.471)	0.486 (0.640)	0.711 (0.825)	0.000 (0.000)	2.609 (0.536)	0.282 (0.461)	1.021 (0.990)	0.484 (0.629)
government non-classified (omitted: no security reported)	1.666*** (0.000)	1.235 (0.389)	2.256 (0.257)	1.471 (0.114)	1.905*** (0.000)	1.510** (0.022)	1.313 (0.539)	1.644* (0.061)	1.849*** (0.003)	2.210*** (0.002)	1.294 (0.331)
government confidential	1.732*** (0.001)	0.294 (0.400)	3.880 (0.373)	4.430*** (0.005)	1.166 (0.765)	1.071 (0.921)	3.543 (0.198)	1.130 (0.885)	0.584 (0.527)	1.947 (0.430)	2.254 (0.177)
government secret	1.444*** (0.004)	0.260 (0.351)	14.38** (0.012)	1.190 (0.776)	1.212 (0.549)	0.651 (0.326)	1.601 (0.509)	2.179 (0.175)	2.624* (0.057)	2.395 (0.140)	1.672 (0.387)
government top secret	0.967 (0.810)	1.123 (0.900)	1.218 (0.905)	6.156** (0.017)	2.347** (0.047)	0.0733* (0.067)	1.873 (0.525)	1.353 (0.722)	1.818 (0.348)	1.064 (0.917)	0.875 (0.818)
Constant	0.00153*** (0.00000)	0.0308*** (0.00000)	3.09700 (0.62300)	0.0225*** (0.00001)	0.00773*** (0.00000)	0.00739*** (0.00000)	0.00142*** (0.00000)	0.00378*** (0.00000)	0.0155*** (0.00000)	0.00558*** (0.00000)	0.0235*** (0.00000)
Observations	82,747	4,725	1,503	1,897	4,404	4,171	1,513	4,549	2,949	5,527	2,228

Table 5: Industry Specific Regression Results

	325	327	331	332	333	334	335	336	337	339	423
SDB not 8(a)	0.571*** (0.000)	0.488*** (0.000)	0.583*** (0.000)	0.464*** (0.000)	0.568*** (0.000)	0.594*** (0.000)	0.496*** (0.000)	0.564*** (0.000)	0.616*** (0.000)	0.609*** (0.000)	0.634*** (0.000)
8(a)	0.650 (0.156)	0.337** (0.045)	0.373** (0.031)	0.419*** (0.000)	0.531*** (0.001)	0.636*** (0.001)	0.362*** (0.001)	0.468*** (0.000)	1.054 (0.839)	0.647** (0.037)	0.878 (0.572)
woman-owned	0.935 (0.523)	1.080 (0.666)	1.296* (0.065)	1.107* (0.092)	1.037 (0.559)	0.972 (0.604)	1.091 (0.363)	1.064 (0.271)	1.094 (0.447)	0.859** (0.017)	1.110 (0.234)
minority-owned	0.888 (0.310)	1.045 (0.832)	1.296 (0.113)	1.078 (0.309)	1.094 (0.227)	0.908 (0.110)	1.110 (0.253)	1.200** (0.023)	0.863 (0.312)	0.962 (0.602)	0.949 (0.613)
hubzone	1.054 (0.811)	0.636 (0.228)	1.423 (0.144)	1.241* (0.074)	1.257* (0.079)	1.301** (0.020)	1.286* (0.097)	1.334** (0.034)	1.219 (0.369)	1.020 (0.894)	1.829*** (0.000)
service-disabled veteran	1.112 (0.435)	1.059 (0.814)	0.840 (0.448)	1.097 (0.314)	1.046 (0.630)	0.921 (0.305)	0.876 (0.260)	0.883 (0.245)	1.298* (0.098)	0.883 (0.003)	1.011 (0.937)
other veteran	0.889 (0.517)	0.951 (0.873)	0.674 (0.133)	1.007 (0.936)	1.046 (0.621)	0.842** (0.038)	0.776* (0.058)	0.957 (0.664)	0.768 (0.267)	0.968 (0.747)	0.722* (0.050)
log age	0.762*** (0.000)	0.874 (0.103)	1.021 (0.750)	0.912*** (0.000)	0.941** (0.022)	1.198*** (0.000)	1.040 (0.282)	1.147*** (0.000)	0.971 (0.653)	0.929*** (0.006)	0.938 (0.112)
log employment	0.772*** (0.000)	0.797** (0.001)	0.814*** (0.000)	0.903*** (0.000)	0.884*** (0.000)	0.917*** (0.000)	0.909*** (0.000)	0.853*** (0.000)	0.767*** (0.000)	0.960** (0.046)	0.841*** (0.000)
log receipts	1.234*** (0.000)	1.216*** (0.000)	1.142*** (0.000)	1.082*** (0.000)	1.124*** (0.000)	1.108*** (0.000)	1.081*** (0.000)	1.084*** (0.000)	1.286*** (0.000)	1.119*** (0.000)	1.174*** (0.000)
sole proprietorship (omitted: "other" orgs)	0.580** (0.014)	1.245 (0.528)	0.592* (0.098)	0.797* (0.074)	0.682*** (0.004)	0.658*** (0.000)	0.825 (0.278)	0.790* (0.095)	0.748 (0.300)	0.679*** (0.005)	0.541*** (0.004)
partnership	0.467*** (0.000)	0.601 (0.136)	0.617* (0.081)	0.717*** (0.004)	0.748** (0.011)	0.642*** (0.000)	0.684** (0.016)	0.709*** (0.006)	0.929 (0.756)	0.686*** (0.002)	0.757 (0.102)
corporate not tax-exempt	0.592*** (0.001)	0.762 (0.282)	0.648** (0.043)	0.785*** (0.009)	0.755*** (0.002)	0.717*** (0.000)	0.828 (0.119)	0.733*** (0.002)	0.785 (0.222)	0.750*** (0.004)	0.747** (0.037)
corporate tax-exempt	0.339 (0.466)	0.906 (0.955)	0.938 (0.949)	0.126 (0.148)	1.034 (0.954)	0.393 (0.158)	0.764 (0.758)	0.119 (0.137)	0.541 (0.491)	0.411 (0.300)	0.195 (0.255)
government non-classified (omitted: no security reported)	1.423*** (0.002)	2.431*** (0.000)	1.920*** (0.000)	1.808*** (0.000)	1.372*** (0.000)	1.243*** (0.000)	1.518*** (0.000)	1.265*** (0.000)	1.429** (0.012)	1.380*** (0.000)	1.719*** (0.000)
government confidential	2.675*** (0.000)	1.877 (0.218)	1.582 (0.211)	1.686*** (0.000)	1.391** (0.044)	1.275* (0.083)	2.148*** (0.000)	1.330* (0.071)	0.772 (0.601)	1.560** (0.029)	2.245*** (0.003)
government secret	2.190*** (0.000)	2.990*** (0.008)	1.718 (0.116)	2.224*** (0.000)	1.721*** (0.000)	1.239*** (0.003)	1.986*** (0.000)	1.073 (0.461)	1.054 (0.872)	1.651*** (0.000)	1.717*** (0.009)
government top secret	0.920 (0.792)	4.778*** (0.002)	2.186* (0.090)	1.201 (0.172)	1.064 (0.641)	0.767*** (0.000)	1.304** (0.042)	0.702*** (0.001)	0.924 (0.813)	0.971 (0.866)	3.080*** (0.000)
Constant	0.00871*** (0.00000)	0.00148*** (0.00000)	0.0129*** (0.00000)	0.0214*** (0.00000)	0.0134*** (0.00000)	0.0107*** (0.00000)	0.0219*** (0.00000)	0.0306*** (0.00000)	0.00682*** (0.00000)	0.0106*** (0.00000)	0.00205*** (0.00000)
Observations	14,579	4,653	3,820	31,295	27,081	33,320	14,334	18,763	6,527	23,588	58,281

Table 5: Industry Specific Regression Results

	424	425	441	442	443	444	445	446	447	448	451
SDB not 8(a)	0.716* (0.098)	0.611 (0.274)	0.520** (0.037)	1.039 (0.927)	1.015 (0.975)	0.326*** (0.000)	1.658 (0.843)	0.635 (0.303)	0.980 (0.991)	0.319* (0.075)	0.589 (0.424)
8(a)	1.722 (0.281)	9.444** (0.032)	0.695 (0.700)	0.634 (0.765)	1.568 (0.614)	0.112** (0.015)	321.400 (0.142)	0.269 (0.391)	10.630 (0.311)	0.461 (0.684)	1.072 (0.966)
woman-owned	1.007 (0.969)	0.518 (0.172)	1.084 (0.806)	1.014 (0.417)	1.014 (0.972)	0.681* (0.054)	0.640 (0.838)	0.906 (0.819)	2.500 (0.636)	1.128 (0.846)	1.416 (0.539)
minority-owned	0.724 (0.174)	0.169** (0.020)	1.289 (0.488)	0.833 (0.697)	1.760 (0.254)	1.108 (0.665)	0.803 (0.944)	0.848 (0.733)	0.982 (0.994)	0.147** (0.043)	1.449 (0.624)
hubzone	1.207 (0.657)	0.501 (0.643)	3.865** (0.014)	1.319 (0.758)	2.208 (0.270)	0.956 (0.912)	15.650 (0.347)	3.828* (0.060)	11.140 (0.294)	7.417** (0.042)	0.795 (0.883)
service-disabled veteran	0.756 (0.413)	0.665 (0.556)	1.137 (0.786)	1.468 (0.475)	0.550 (0.408)	0.315*** (0.001)	5.290 (0.522)	1.402 (0.523)	2.749 (0.613)	1.251 (0.776)	2.374 (0.259)
other veteran	0.824 (0.590)	1.840 (0.243)	1.260 (0.583)	2.115 (0.187)	0.176 (0.231)	0.903 (0.752)	6.243 (0.352)	0.642 (0.602)	2.345 (0.732)	0.161 (0.294)	1.188 (0.844)
log age	0.956 (0.622)	0.891 (0.545)	0.868 (0.266)	0.799 (0.270)	1.658** (0.048)	0.729*** (0.000)	1.084 (0.894)	0.689** (0.020)	0.745 (0.707)	0.562** (0.022)	1.792* (0.084)
log employment	0.866** (0.049)	1.551*** (0.000)	0.924 (0.402)	0.799 (0.128)	0.826 (0.160)	0.678*** (0.000)	1.820* (0.058)	1.198 (0.153)	1.639 (0.335)	0.569*** (0.002)	0.761 (0.249)
log receipts	1.218*** (0.000)	0.972 (0.586)	1.047 (0.344)	1.043 (0.538)	1.000 (0.995)	1.212*** (0.000)	0.910 (0.549)	1.105 (0.168)	0.847 (0.252)	1.053 (0.535)	1.429** (0.021)
sole proprietorship (omitted: "other" orgs)	1.086 (0.843)	0.218 (0.107)	0.284** (0.025)	0.587 (0.514)	0.0388** (0.032)	0.359** (0.017)	0.385 (0.672)	0.390 (0.267)	0.666 (0.857)	0.318 (0.350)	0.225 (0.349)
partnership	0.875 (0.716)	0.369 (0.102)	0.239*** (0.003)	0.693 (0.623)	0.396 (0.169)	0.214*** (0.001)	0.325 (0.494)	0.336 (0.157)	0.303 (0.540)	0.741 (0.779)	0.556 (0.533)
corporate not tax-exempt	0.815 (0.495)	0.267*** (0.007)	0.340*** (0.001)	0.559 (0.359)	0.191*** (0.003)	0.605* (0.063)	0.142 (0.102)	0.573 (0.343)	0.111 (0.135)	0.892 (0.904)	0.593 (0.475)
corporate tax-exempt	1.349 (0.840)	1.876 (0.760)	2.183 (0.708)	2.302 (0.706)	2.550 (0.610)	8.844 (0.197)	4.552 (0.629)	22.30* (0.087)	1.110 (0.973)	4.432*** (0.000)	107.5** (0.034)
government non-classified (omitted: no security reported)	1.985*** (0.004)	0.500 (0.298)	2.003* (0.069)	2.915** (0.019)	3.177*** (0.008)	5.607*** (0.000)	2.777 (0.565)	2.412* (0.069)	2.640 (0.666)	4.171** (0.017)	2.798 (0.112)
government confidential	2.476 (0.164)	1.655 (0.731)	3.203 (0.174)	2.107 (0.609)	4.706* (0.095)	9.160*** (0.000)	24.350 (0.280)	2.933 (0.461)	12.790 (0.369)	28.27** (0.034)	4.181 (0.353)
government secret	2.678* (0.081)	0.500 (0.633)	3.196* (0.058)	2.045 (0.618)	2.161 (0.270)	22.09*** (0.000)	8.058 (0.453)	4.685 (0.105)	13.040 (0.445)	7.341* (0.091)	3.128 (0.466)
government top secret	1.725 (0.401)	0.254 (0.348)	0.576 (0.752)	4.292 (0.168)	0.192** (0.047)	37.63*** (0.000)	12.730 (0.409)	3.410 (0.181)	2.738 (0.734)	14.020 (0.127)	5.654 (0.267)
Constant	0.000178*** (0.00000)	0.00152*** (0.00000)	0.0230*** (0.00011)	0.26100 (0.33300)	0.0678* (0.07430)	0.0129*** (0.00000)	0.00708 (0.20500)	0.000355*** (0.00000)	0.51400 (0.86700)	0.22100 (0.40800)	0.0000957*** (0.00010)
Observations	18,368	3,718	5,720	3,229	2,041	9,013	1,222	4,457	484	2,606	2,382

Table 5: Industry Specific Regression Results

	452	453	454	481	482	483	484	485	486	487	488
SDB not 8(a)	4.309 (0.261)	0.594 (0.116)	2.089 (0.178)	0.974 (0.919)	0.927 (0.963)	0.936 (0.863)	0.654** (0.048)	0.425*** (0.000)	0.374 (0.179)	0.194 (0.179)	0.395*** (0.000)
8(a)	1.510** (0.042)	0.269 (0.371)	2.443 (0.571)	0.832 (0.904)	6.451 (0.543)	2.743 (0.319)	3.045*** (0.001)	1.248 (0.687)	0.619 (0.788)	15.700 (0.436)	0.374*** (0.008)
woman-owned	0.104 (0.231)	1.269 (0.423)	0.797 (0.693)	0.878 (0.669)	1.190 (0.911)	0.669 (0.370)	0.835 (0.383)	0.789 (0.243)	0.847 (0.644)	0.501 (0.167)	1.195 (0.167)
minority-owned	0.164 (0.259)	1.618 (0.151)	0.655 (0.499)	0.218*** (0.003)	1.393 (0.849)	0.445* (0.096)	1.227 (0.375)	0.304*** (0.000)	0.517 (0.530)	0.350 (0.451)	1.124 (0.451)
hubzone	3.794 (0.587)	0.960 (0.963)	4.378 (0.121)	3.028* (0.066)	3.419 (0.595)	0.962 (0.964)	0.441* (0.077)	3.045*** (0.003)	2.275 (0.469)	8.620 (0.217)	1.466 (0.109)
service-disabled veteran	0.206 (0.403)	1.158 (0.750)	0.191 (0.258)	0.526 (0.215)	1.628 (0.779)	0.272 (0.130)	0.967 (0.912)	0.842 (0.513)	1.153 (0.864)	1.185 (0.916)	0.779 (0.240)
other veteran	0.613 (0.830)	1.352 (0.525)	1.041 (0.964)	1.223 (0.498)	2.505 (0.670)	0.104 (0.113)	0.699 (0.349)	0.895 (0.707)	0.388 (0.400)	2.724 (0.327)	0.936 (0.734)
log age	2.367 (0.179)	0.793 (0.128)	1.300 (0.291)	1.692*** (0.000)	1.050 (0.960)	1.160 (0.396)	1.474*** (0.000)	1.299*** (0.003)	1.784* (0.079)	1.294 (0.607)	1.384*** (0.000)
log employment	0.564 (0.238)	0.728*** (0.005)	0.731* (0.069)	1.057 (0.496)	0.929 (0.902)	0.880 (0.224)	0.976 (0.715)	0.997 (0.953)	1.047 (0.757)	1.131 (0.708)	0.939 (0.106)
log receipts	0.992 (0.965)	1.265*** (0.002)	1.097 (0.379)	1.020 (0.674)	0.981 (0.908)	1.034 (0.538)	1.094** (0.034)	0.973 (0.235)	0.966 (0.612)	0.894 (0.295)	1.189*** (0.000)
sole proprietorship (omitted: "other" orgs)	0.056 (0.104)	0.267** (0.037)	0.328 (0.276)	0.241* (0.051)	0.819 (0.931)	0.742 (0.585)	0.995 (0.991)	2.628*** (0.004)	0.167* (0.085)	2.175 (0.677)	0.932 (0.784)
partnership	0.0371* (0.065)	0.655 (0.399)	0.349 (0.224)	0.383** (0.048)	1.216 (0.923)	0.315** (0.036)	0.709 (0.383)	0.625 (0.224)	0.0114*** (0.005)	1.873 (0.740)	0.616** (0.047)
corporate not tax-exempt	0.0666** (0.044)	0.395** (0.034)	0.513 (0.288)	0.500** (0.049)	0.433 (0.689)	0.317*** (0.002)	0.754 (0.337)	0.434** (0.010)	0.157*** (0.004)	0.557 (0.731)	0.697** (0.049)
corporate tax-exempt	14.430 (0.443)	2.810 (0.566)	3.066 (0.572)	40.82** (0.039)	0.000 (0.000)	3.901 (0.440)	0.611 (0.744)	3.286 (0.507)	0.000 (0.000)	0.000 (0.000)	0.411 (0.542)
government non-classified (omitted: no security reported)	1.068 (0.968)	2.237** (0.045)	2.074 (0.304)	0.716 (0.372)	3.225 (0.519)	1.200 (0.723)	3.002*** (0.000)	0.726 (0.330)	4.141** (0.010)	1.102 (0.948)	1.826*** (0.000)
government confidential	60.380 (0.140)	3.785 (0.117)	5.466 (0.267)	2.216 (0.256)	8.674 (0.213)	5.336** (0.020)	5.005*** (0.000)	2.746 (0.107)	4.879 (0.347)	21.640 (0.184)	1.524 (0.274)
government secret	39.030 (0.140)	6.614*** (0.000)	6.526* (0.057)	1.284 (0.475)	4.683 (0.418)	3.978*** (0.000)	2.220** (0.036)	0.528 (0.333)	0.917 (0.957)	3.625 (0.447)	0.914 (0.666)
government top secret	4.614 (0.413)	3.321** (0.040)	5.067 (0.113)	1.234 (0.582)	6.266 (0.447)	2.303 (0.178)	1.308 (0.640)	1.884 (0.192)	1.446 (0.822)	3.490 (0.655)	0.857 (0.451)
Constant	1.85300 (0.84400)	0.0167*** (0.00099)	0.0326* (0.04810)	0.00148*** (0.00000)	0.32300 (0.82000)	0.0246*** (0.00085)	0.000242*** (0.00000)	0.0125*** (0.00000)	0.00161*** (0.00061)	0.06070 (0.38300)	0.000243*** (0.00000)
Observations	424	7,117	3,983	2,927	404	1,987	15,302	4,871	992	901	16,219

Table 5: Industry Specific Regression Results

	491	492	493	511	512	515	517	518	519	522	523
SDB not 8(a)	11.47* (0.086)	0.727 (0.354)	0.495** (0.034)	0.478*** (0.000)	1.045 (0.886)	0.968 (0.931)	0.657** (0.023)	0.537*** (0.006)	0.368*** (0.000)	0.162* (0.074)	0.502 (0.285)
8(a)	52.48** (0.039)	1.336 (0.657)	0.824 (0.725)	0.672 (0.131)	10.92*** (0.131)	1.844 (0.541)	1.111 (0.766)	1.271 (0.489)	1.388 (0.490)	0.291 (0.451)	2.263 (0.635)
woman-owned	0.612 (0.670)	1.061 (0.865)	1.382 (0.260)	0.658*** (0.000)	0.463** (0.025)	0.517 (0.141)	0.833 (0.338)	0.540*** (0.007)	0.710 (0.148)	1.693 (0.500)	0.445 (0.237)
minority-owned	0.101 (0.130)	0.666 (0.258)	1.076 (0.828)	0.678*** (0.001)	0.166*** (0.002)	0.596 (0.295)	0.485*** (0.001)	0.664* (0.076)	0.389*** (0.002)	0.959 (0.961)	0.189* (0.072)
hubzone	3.430 (0.288)	1.074 (0.917)	1.171 (0.756)	1.802*** (0.004)	0.322 (0.426)	0.784 (0.870)	1.841** (0.043)	1.112 (0.783)	0.884 (0.824)	0.656 (0.776)	1.009 (0.995)
service-disabled veteran	0.896 (0.938)	1.744 (0.139)	1.180 (0.658)	0.870 (0.406)	0.114 (0.129)	0.318 (0.181)	0.974 (0.910)	0.601 (0.123)	0.747 (0.429)	2.009 (0.475)	0.438 (0.359)
other veteran	0.871 (0.943)	1.609 (0.359)	1.084 (0.872)	0.961 (0.817)	1.324 (0.578)	0.441 (0.337)	0.795 (0.462)	0.998 (0.995)	0.897 (0.792)	1.571 (0.760)	0.748 (0.757)
log age	2.465 (0.262)	1.637** (0.172)	1.219 (0.196)	1.554*** (0.000)	1.304 (0.116)	0.738** (0.031)	1.083 (0.269)	1.302*** (0.009)	1.400*** (0.001)	0.721 (0.207)	1.937*** (0.001)
log employment	1.607*** (0.008)	1.153 (0.172)	0.916 (0.316)	0.876*** (0.000)	1.162* (0.092)	1.103* (0.084)	1.070 (0.145)	0.896 (0.104)	0.936 (0.252)	1.135 (0.295)	0.842* (0.064)
log receipts	0.984 (0.927)	1.082 (0.233)	1.122* (0.085)	1.124*** (0.000)	0.988 (0.808)	0.995 (0.902)	1.093*** (0.005)	1.270*** (0.000)	1.080* (0.074)	0.961 (0.583)	0.986 (0.837)
sole proprietorship (omitted: "other" orgs)	0.175 (0.373)	0.350 (0.127)	0.777 (0.503)	0.735* (0.001)	0.664 (0.653)	0.344** (0.035)	1.181 (0.193)	0.614 (0.420)	0.644 (0.349)	0.219 (0.172)	0.546 (0.249)
partnership	0.566 (0.675)	0.696 (0.521)	0.777 (0.547)	0.735* (0.091)	0.664 (0.491)	0.344** (0.047)	1.181 (0.550)	0.614 (0.199)	0.644 (0.260)	0.219 (0.122)	0.546 (0.330)
corporate not tax-exempt	0.225 (0.242)	0.397** (0.041)	0.391*** (0.007)	0.806 (0.154)	0.677 (0.429)	0.551 (0.123)	0.891 (0.622)	0.931 (0.804)	1.013 (0.966)	0.304* (0.060)	0.534 (0.264)
corporate tax-exempt	1.883 (0.787)	3.841 (0.479)	0.861 (0.920)	0.243 (0.327)	23.46* (0.059)	1.416 (0.838)	0.417 (0.548)	0.745 (0.840)	1.855 (0.679)	10.030 (0.310)	235.0*** (0.004)
government non-classified (omitted: no security reported)	4.707 (0.180)	0.754 (0.526)	1.600 (0.164)	1.109 (0.292)	2.220*** (0.009)	0.246** (0.033)	0.888 (0.526)	0.939 (0.765)	0.928 (0.731)	2.093 (0.304)	0.228 (0.282)
government confidential	18.31** (0.044)	1.407 (0.694)	0.561 (0.686)	0.747 (0.418)	0.584 (0.708)	0.556 (0.685)	0.416 (0.291)	0.862 (0.787)	0.737 (0.641)	5.130* (0.072)	0.707 (0.815)
government secret	2.186 (0.534)	0.845 (0.755)	2.001* (0.060)	1.133 (0.393)	0.736 (0.719)	0.849 (0.818)	1.112 (0.648)	0.576 (0.127)	0.299*** (0.007)	5.061* (0.087)	4.538** (0.023)
government top secret	0.634 (0.774)	0.676 (0.435)	1.446 (0.346)	0.769** (0.012)	0.161*** (0.009)	0.524 (0.139)	0.597*** (0.000)	0.689** (0.038)	0.268*** (0.000)	1.055 (0.953)	3.547*** (0.008)
Constant	6.17e-05** (0.03260)	0.00130*** (0.00000)	0.000889*** (0.00000)	0.00441*** (0.00000)	0.00654*** (0.00000)	0.0774*** (0.00617)	0.00231*** (0.00000)	0.000194*** (0.00000)	0.00471*** (0.00000)	0.00731** (0.01530)	0.0333*** (0.00696)
Observations	743	2,757	7,333	17,744	6,422	1,680	10,367	17,106	11,795	2,056	2,207

Table 5: Industry Specific Regression Results

	524	525	531	532	533	541	551	561	562	611	621
SDB not 8(a)	0.224** (0.020)	1.218 (0.878)	1.036 (0.793)	0.549*** (0.000)	0.898 (0.947)	0.563*** (0.000)	0.398 (0.633)	0.646*** (0.000)	0.621*** (0.000)	0.472*** (0.000)	0.576*** (0.000)
8(a)	1.121 (0.898)	10.280 (0.307)	3.442*** (0.003)	0.831 (0.579)	3.317 (0.752)	2.183*** (0.000)	4.553 (0.467)	2.705*** (0.000)	1.465** (0.023)	2.032*** (0.000)	2.229*** (0.001)
woman-owned	0.307* (0.087)	0.544 (0.696)	0.666** (0.017)	0.876 (0.380)	1.253 (0.894)	0.858*** (0.000)	1.716 (0.742)	0.874*** (0.004)	1.072 (0.458)	0.971 (0.741)	0.771** (0.029)
minority-owned	1.762 (0.338)	0.245 (0.379)	0.344*** (0.000)	1.228 (0.214)	1.226 (0.899)	0.837*** (0.000)	1.174 (0.914)	0.565*** (0.000)	0.646*** (0.000)	0.422*** (0.000)	0.862 (0.279)
hubzone	0.534 (0.672)	5.917 (0.355)	1.152 (0.743)	1.521* (0.086)	2.554 (0.773)	1.163** (0.045)	7.859 (0.310)	1.188* (0.067)	1.196 (0.247)	0.647* (0.090)	1.046 (0.891)
service-disabled veteran	1.952 (0.251)	3.839 (0.296)	0.491* (0.062)	1.064 (0.772)	1.750 (0.751)	0.903** (0.037)	1.814 (0.716)	1.053 (0.417)	0.999 (0.993)	1.246* (0.054)	2.143*** (0.000)
other veteran	0.382 (0.505)	2.213 (0.599)	1.170 (0.485)	0.888 (0.639)	3.893 (0.398)	0.673*** (0.000)	3.244 (0.497)	1.015 (0.848)	1.078 (0.641)	1.203 (0.168)	0.856 (0.446)
log age	0.981 (0.925)	0.783 (0.629)	1.631*** (0.000)	1.011 (0.874)	0.943 (0.930)	1.275*** (0.000)	0.707 (0.524)	1.400*** (0.000)	1.349*** (0.000)	1.299*** (0.000)	1.804*** (0.000)
log employment	1.091 (0.435)	1.306 (0.276)	1.054* (0.061)	1.119*** (0.003)	1.058 (0.917)	1.035*** (0.000)	1.305 (0.305)	1.031** (0.042)	1.005 (0.844)	0.982 (0.525)	0.805*** (0.000)
log receipts	1.075 (0.351)	0.943 (0.569)	1.037* (0.056)	1.030 (0.234)	0.966 (0.812)	1.033*** (0.000)	0.970 (0.824)	0.994 (0.434)	1.034** (0.046)	1.088*** (0.000)	1.084*** (0.000)
sole proprietorship (omitted: "other" orgs)	0.594 (0.260)	0.665 (0.533)	1.148 (0.914)	1.010 (0.835)	0.856 (0.935)	0.889* (0.056)	0.579 (0.822)	0.665*** (0.001)	1.162 (0.700)	0.941 (0.370)	0.627* (0.024)
partnership	0.594 (0.426)	0.665 (0.729)	1.148 (0.515)	1.010 (0.971)	0.856 (0.945)	0.889* (0.093)	0.579 (0.638)	0.665*** (0.000)	1.162 (0.415)	0.941 (0.746)	0.627* (0.057)
corporate not tax-exempt	0.362** (0.040)	0.377 (0.353)	1.224 (0.316)	1.026 (0.910)	0.527 (0.769)	0.989 (0.849)	0.156* (0.095)	0.717*** (0.000)	1.045 (0.783)	0.879 (0.424)	0.787 (0.231)
corporate tax-exempt	38.63** (0.041)	60.040 (0.189)	1.554 (0.772)	0.830 (0.899)	0.000 (0.000)	0.369** (0.016)	4.421 (0.564)	0.270** (0.018)	0.178 (0.228)	1.107 (0.906)	0.274 (0.374)
government non-classified (omitted: no security reported)	1.036 (0.951)	0.714 (0.818)	1.333 (0.193)	1.235 (0.213)	2.440 (0.568)	1.534*** (0.000)	1.428 (0.822)	1.307*** (0.000)	1.209** (0.000)	0.975 (0.824)	1.303* (0.088)
government confidential	0.746 (0.840)	3.918 (0.413)	2.651** (0.020)	1.498 (0.330)	10.880 (0.377)	1.836*** (0.000)	18.380 (0.155)	2.140*** (0.000)	1.507 (0.156)	0.972 (0.931)	1.265 (0.491)
government secret	0.998 (0.998)	2.951 (0.566)	0.856 (0.753)	0.650 (0.328)	1.911 (0.728)	2.412*** (0.000)	1.898 (0.704)	1.503*** (0.000)	0.599** (0.046)	1.064 (0.689)	0.538*** (0.008)
government top secret	0.583 (0.430)	0.927 (0.965)	1.014 (0.972)	0.514* (0.064)	3.484 (0.617)	2.671*** (0.000)	4.191 (0.223)	1.688*** (0.000)	0.466*** (0.002)	0.852 (0.178)	1.287 (0.322)
Constant	0.00504*** (0.00026)	0.14400 (0.39700)	0.000614*** (0.00000)	0.00417*** (0.00000)	0.45600 (0.89000)	0.00356*** (0.00000)	0.04690 (0.15800)	0.00417*** (0.00000)	0.00236*** (0.00000)	0.00162*** (0.00000)	0.00215*** (0.00000)
Observations	3,059	734	22,905	11,520	145	177,409	1,013	84,841	21,813	45,601	25,034

Table 5: Industry Specific Regression Results

	622	623	624	711	712	713	721	722	811	812	813
SDB not 8(a)	0.492 (0.133)	0.847 (0.503)	0.481*** (0.000)	0.307*** (0.000)	0.407** (0.015)	0.216*** (0.001)	0.733*** (0.004)	0.708* (0.084)	0.661*** (0.000)	0.527*** (0.000)	0.740 (0.235)
8(a)	3.532** (0.045)	5.168* (0.052)	1.156 (0.724)	1.392 (0.648)	0.572 (0.557)	2.620 (0.247)	0.749 (0.625)	1.523 (0.315)	0.752* (0.086)	0.806 (0.708)	6.709*** (0.000)
woman-owned	1.055 (0.896)	0.904 (0.771)	1.020 (0.840)	0.769 (0.246)	1.076 (0.874)	0.430* (0.071)	0.996 (0.977)	1.821*** (0.001)	0.709*** (0.000)	0.539*** (0.000)	0.803 (0.351)
minority-owned	0.479 (0.150)	0.254*** (0.006)	0.358*** (0.000)	1.178 (0.531)	1.136 (0.767)	1.022 (0.963)	0.842 (0.158)	0.754 (0.180)	0.670*** (0.000)	0.410*** (0.000)	0.663 (0.138)
hubzone	1.391 (0.650)	0.392 (0.536)	0.410* (0.080)	1.392 (0.703)	2.989 (0.225)	0.520 (0.656)	1.361 (0.553)	1.701 (0.193)	1.190 (0.233)	1.773 (0.214)	2.247 (0.159)
service-disabled veteran	2.129* (0.079)	0.152 (0.189)	0.412*** (0.000)	1.411 (0.355)	0.187 (0.242)	0.558 (0.384)	0.550** (0.049)	0.677 (0.300)	0.732*** (0.001)	0.635* (0.078)	0.579 (0.182)
other veteran	1.001 (0.999)	1.172 (0.810)	0.531*** (0.001)	0.995 (0.991)	0.965 (0.958)	2.198** (0.050)	1.158 (0.479)	1.322 (0.411)	0.785*** (0.004)	0.618 (0.157)	1.110 (0.780)
log age	1.214 (0.284)	0.887 (0.174)	2.746*** (0.000)	1.115 (0.354)	1.143 (0.420)	1.095 (0.577)	1.052 (0.248)	1.734*** (0.000)	1.168*** (0.000)	0.800*** (0.001)	1.394*** (0.003)
log employment	0.915 (0.372)	1.133** (0.046)	0.475*** (0.000)	0.957 (0.601)	0.775** (0.028)	1.095 (0.317)	1.086*** (0.003)	1.164*** (0.005)	1.101*** (0.000)	1.022 (0.620)	0.953 (0.441)
log receipts	1.304*** (0.009)	1.062 (0.211)	0.993 (0.604)	0.976 (0.427)	0.980 (0.655)	1.020 (0.719)	0.996 (0.764)	0.973 (0.306)	1.040*** (0.000)	1.076*** (0.003)	0.953* (0.084)
sole proprietorship (omitted: "other" orgs)	0.475 (0.358)	1.059 (0.118)	0.385*** (0.021)	0.545 (0.292)	0.575 (0.203)	0.432* (0.125)	0.954 (0.000)	0.339*** (0.008)	0.786** (0.056)	0.392*** (0.564)	0.251** (0.138)
partnership	0.475 (0.167)	1.059 (0.819)	0.385*** (0.000)	0.545 (0.387)	0.575 (0.445)	0.432* (0.084)	0.954 (0.803)	0.339*** (0.006)	0.786** (0.026)	0.392*** (0.003)	0.251** (0.022)
corporate not tax-exempt	0.411** (0.040)	0.723 (0.194)	0.552*** (0.003)	1.122 (0.842)	0.504 (0.258)	0.366** (0.016)	0.935 (0.709)	0.617 (0.125)	0.762*** (0.002)	0.534 (0.013)	0.534 (0.128)
corporate tax-exempt	0.338 (0.485)	0.934 (0.969)	1.372 (0.831)	14.400 (0.169)	6.257 (0.264)	352.3** (0.015)	2.485 (0.544)	0.843 (0.910)	0.464 (0.361)	4.899 (0.120)	4.039 (0.373)
government non-classified (omitted: no security reported)	1.037 (0.933)	0.967 (0.959)	1.426*** (0.009)	0.978 (0.950)	1.542 (0.324)	1.258 (0.631)	1.480** (0.047)	2.396*** (0.000)	1.043 (0.536)	1.283 (0.314)	1.679* (0.091)
government confidential	3.577 (0.166)	8.559** (0.019)	3.046*** (0.000)	1.159 (0.873)	1.304 (0.854)	2.629 (0.292)	1.266 (0.676)	0.323 (0.430)	1.072 (0.708)	0.865 (0.862)	4.404*** (0.004)
government secret	0.895 (0.874)	5.335* (0.091)	1.466 (0.300)	0.925 (0.909)	0.374 (0.495)	1.156 (0.871)	0.890 (0.860)	0.919 (0.867)	1.101 (0.380)	1.720* (0.066)	1.445 (0.480)
government top secret	0.461 (0.256)	0.944 (0.969)	0.706 (0.457)	0.099 (0.112)	2.080 (0.412)	0.679 (0.678)	1.442 (0.524)	0.390 (0.263)	0.460*** (0.000)	0.535 (0.261)	1.931 (0.108)
Constant	0.000834*** (0.00002)	0.00600*** (0.00000)	0.0413*** (0.00000)	0.0561*** (0.00064)	0.0916** (0.03280)	0.0135*** (0.00005)	0.00818*** (0.00000)	0.000500*** (0.00000)	0.00659*** (0.00000)	0.0390*** (0.00000)	0.0327*** (0.00000)
Observations	2,486	4,935	15,115	7,415	2,708	3,103	12,836	6,470	36,540	10,519	9,000

Table 6
NAICS Codes Referenced in Table 5

111 – Crop Production	327 – Nonmetallic Mineral Product Manufacturing	492 – Couriers and Messengers
112 – Animal Production	331 – Primary Metal Manufacturing	493 – Warehousing and Storage
113 – Forestry and Logging	332 – Fabricated Metal Product Manufacturing	511 – Publishing Industries (except Internet)
114 – Fishing, Hunting and Trapping	333 – Machinery Manufacturing	512 – Motion Picture and Sound Recording Industries
115 – Support Activities for Agriculture and Forestry	334 – Computer and Electronic Product Manufacturing	515 – Broadcasting (except Internet)
211 – Oil and Gas Extraction	335 – Electrical Equipment, Appliance and Component Manufacturing	517 – Telecommunications
212 – Mining (except Oil and Gas)	336 – Transportation Equipment Manufacturing	518 – Data Processing, Hosting, and Related Services
213 – Support Activities for Mining	337 – Furniture and Related Product Manufacturing	519 – Other Information Services
221 – Utilities	339 – Miscellaneous Manufacturing	522 – Credit Intermediation and Related Activities
236 – Construction of Buildings	423 – Merchant Wholesalers, Durable Goods	523 – Financial Investments and Related Activities
237 – Heavy and Civil Engineering Construction	424 – Merchant Wholesalers, Nondurable Goods	524 – Insurance Carriers and Related Activities
238 – Specialty Trade Contractors	425 – Wholesale Electronic Markets and Agents and Brokers	525 – Funds, Trusts, and Other Financial Vehicles
311 – Food Manufacturing	441 – Motor Vehicle and Parts Dealers	531 – Real Estate
312 – Beverage and Tobacco Product Manufacturing	442 – Furniture and Home Furnishings Stores	532 – Rental and Leasing Services
313 – Textile Mills	443 – Electronics and Appliance Stores	533 – Lessors of Nonfinancial Intangible Assets
314 – Textile Product Mills	444 – Building Material and Garden Equipment and Supplies Dealers	541 – Professional, Scientific and Technical Services
315 – Apparel Manufacturing	445 – Food and Beverage Stores	551 – Management of Companies and Enterprises
316 – Leather and Allied Product Manufacturing	446 – Health and Personal Care Stores	561 – Administrative and Support Services
321 – Wood Product Manufacturing	447 – Gasoline Stations	562 – Waste Management and Remediation Services
322 – Paper Manufacturing	448 – Clothing and Clothing Accessories Stores	611 – Educational Services
323 – Printing and Related Support Activities	451 – Sporting Good, Hobby, Book and Music Stores	621 – Ambulatory Health Care Services
324 – Petroleum and Coal Products Manufacturing	452 – General Merchandise Stores	622 – Hospitals
325 – Chemical Manufacturing	453 – Miscellaneous Store Retailers	623 – Nursing and Residential Care Facilities
326 – Plastics and Rubber Products Manufacturing	454 – Nonstore Retailers	624 – Social Assistance
327 – Nonmetallic Mineral Product Manufacturing	481 – Air Transportation	711 – Performing Arts, Spectator Sports and Related Industries
331 – Primary Metal Manufacturing	482 – Rail Transportation	712 – Museums, Historical Sites and Similar Institutions
332 – Fabricated Metal Product Manufacturing	483 – Water Transportation	713 – Amusement, Gambling and Recreation Industries
333 – Machinery Manufacturing	484 – Truck Transportation	721 – Accommodation
334 – Computer and Electronic Product Manufacturing	485 – Transit and Ground Passenger Transportation	722 – Food Services and Drinking Places
335 – Electrical Equipment, Appliance and Component Manufacturing	486 – Pipeline Transportation of Natural Gas Industry	811 – Repair and Maintenance
336 – Plastics and Rubber Products Manufacturing	487 – Scenic and Sightseeing Transportation	812 – Personal and Laundry Services
	488 – Support Activities for Transportation	813 – Religious, Grantmaking, Civic, Professional and Similar Organizations
	491 – Postal Service	

ATTACHMENT

1

CV for Daniel Chow

Experience

Senior Economist U.S. Department of Commerce, Minority Business Development Agency | Washington, DC | 2020 - Present

- Advisor and technical expert on economic data, insights, concepts, applications, and methodologies for MBDA's Office of Policy Analysis and Development (OPAD) serving minority businesses and enterprises (MBEs).
- Providing guidance on Federal legislation and administration policies advancing the needs of minority businesses, MBDA's business center program, and economic development initiatives.
- Research collaboration on agency data products to meet the needs of target audiences.
- Liaison on multiple Working Groups to implement Executive Orders on equity, inclusion, skills, and evidence-based policies.
- Leader and advisor on strategies to establish long term capabilities for economic analysis, data, and training within MBDA.

Senior Analyst Center for Human Capital Innovation | Alexandria, VA | 2020

- Technical leadership on statistics, modelling, and data analysis addressing human capital planning estimates for the Naval Facilities Engineering Command (NAVFAC).
- Developed an advanced model for achieving analytically rigorous and accurate comparisons of Full Time Equivalent (FTE) outcomes across NAVFAC commands worldwide.
- Led and collaborated on strategic designs for future NAVFAC training and human capital assessment practices.
- Partnered with Navy officers and civilian leaders on data collections, project statuses, and deliverables.

Senior Economist and Operations Analyst 2M Research Services LLC | Arlington, VA | 2018 - 2019

- Project Manager roles advising on project strategy, meeting project timelines, developing progress reports, and maintaining team progress. Led and contributed to project cycle improvements, findings, logic model, study design, and literature reviews.
- Developed multivariate regression study of surety bond fee changes and forecasted small business loans.
- Multiple analyst roles for several Federal projects in delivering technical guidance to both senior and junior staff.
- Created solutions and engaged with diverse Subject Matter Experts.

U.S. Bureau of Labor Statistics:

Economist Office of Field Operations, Economic Analysis and Information Section | Washington, DC | 2007 - 2018

- Collaborated on multidisciplinary research projects, including database relation and category standardization, requirements development for data search, storage, and distribution, training content delivery via SharePoint, and social media evaluation.
- Edited and approved official news releases on economic data of city-areas, regions, and states as a Clearance Officer.
- Authored professional journal articles, white papers, and research papers on statistics issues for diverse audiences.
- Advocated for the adoption of SharePoint as a distribution point for regional economist's publications and developed numerous sites supporting 6500+ documents and ~50 users.
- Developed and tested training tools and materials on various economic subjects for regional staff and data collectors.
- Researched collaborative techniques and economic analysis methods as part of continued education.

Economist Consumer Price Index, Production and Control Section | Washington, DC | 1999 - 2006

- Designed and instituted time series models and simulations to produce and resolve data matters for inflation statistics.
- Advised staff and visiting international statisticians on seasonal adjustment methodologies and tools as a subject matter expert.
- Researched data collection process improvement methods, developed innovative techniques, and implemented the new processes to increase data quality and accuracy.
- Coached staff and researchers on economic concepts, including Index Theory.
- Evaluated the seasonal adjustment systems comparing data with other inputs, including quality control metrics, charts, SAS tools, and past input/output, and verified that the analytic methods were free of bias or error.
- Developed narrative texts in collaboration with other CPI Economists highlighting trends and influences on commodities.
- Developed training curriculum in seasonal adjustment tools and conducted training for international statisticians.

Economist-Industry Analyst Producer Price Index, Nondurable Goods Section | Washington, DC | 1998 - 1998

- Verified survey respondent price quotes and developed national price statistics for lumber and construction markets.
- Researched marketing dynamics and underlying trends for lumber supply and demand conditions to accurately correct missing or misreported price data.

- Investigated inadequate quotes through issue definition and respondent contact maintaining highly accurate industrial data.
- Wrote and presented monthly industry reports and studies for management briefings.

Education

Master of Arts, Applied Economics - Johns Hopkins University. 2002. Krieger School of Arts and Sciences, Part Time Graduate Studies | Washington, DC

Master of Science, Public Management and Policy - Carnegie Mellon University, H. John Heinz III School of Public Management and Policy. 1992. W.W. Cooper Scholarship | Pittsburgh, PA

Bachelor of Science, Economics - Edinboro University of Pennsylvania. 1990. Honors Program and Dean's List | Edinboro, PA

Software/Platforms

Data Analysis: Stata MP17, SAS, SQL, R Studio, Excel

Time Series: X-12-ARIMA, X-13ARIMA-SEATS, Seas ABS (Australian Bureau of Statistics), Vx12 Visual Interface

Content Management System: SharePoint 2007/2013/2016, SharePoint Designer

Professional Development

Financial Programming and Policies | Data for Effective Policy Making | Computable General Equilibrium (CGE) Modeling | Data Science Foundations: Data Mining | Machine Learning | Effective Social Media Measurement | Gov2.0 Summit | Strategic Communications Planning

Affiliations

American Economic Association | Asian American and Pacific Islander Employee Resource Group | National Association of Business Economics | Trout Unlimited

Publications

Chow, Daniel. "Behavioral Economics: Humans vs. Econs, a History of Bringing Traditional Economics Down to Earth", *BLS Monthly Labor Review*. Bureau of Labor Statistics. May 2016. <https://www.bls.gov/opub/mlr/2016/book-review/behavioral-economics.htm>

Bustinza, Chow, Foster, Reese, and Yochum. "Price Measures of New Vehicles: A Comparison", *BLS Monthly Labor Review*. Bureau of Labor Statistics. July 2008. Vol. 131, No. 7. <https://www.bls.gov/opub/mlr/2008/07/art2full.pdf>

Chow, Scott, and Tiller. "Empirical Evaluation of X-11 and Model-Based Seasonal Adjustment Methods", *BLS Seasonal Adjustment Methodology Team (BLS Innovation Award)*. Bureau of Labor Statistics. April 2008. <https://www.bls.gov/osmr/research-papers/2007/pdf/st070120.pdf>

Chow, Thibodeau, and Wilson. "Application of Concurrent Seasonal Adjustment to the Consumer Price Index", *BLS CPI Program, 2004-2005*. Presented to the Federal Committee on Statistical Methodology, November 2005. https://s3.amazonaws.com/sitesusa/wp-content/uploads/sites/242/2014/05/2007FCSM_Tiller-II-B.pdf

ATTACHMENT

2

Introduction

My name is Robert N. Rubinovitz, and I currently serve as the Deputy Chief Economist in the Economics and Statistics Administration at the Department of Commerce where I oversee the staff in the Office of the Chief Economist. Prior to this, I served as a Vice President at NERA Economic Consulting, where I analyzed economic and policy issues in such areas as telecommunications and media, pharmaceuticals and over-the counter drugs, retail products, and financial services and developed expertise in the application of econometrics to merger analysis and other applied microeconomic topics. From 1988 to 1997, I was an economist at the Antitrust Division of the U.S. Department of Justice, where I analyzed the effects that mergers, long-term contracts, regulations, and legislation had on competition in industries such as banking, healthcare, radio, cable television, and ticket distribution. I also spent time on a detail at the Federal Communications Commission. I have also published articles on cable television deregulation and on the treatment of fixed cost savings in merger analysis. I hold a Ph.D. in Economics from the Massachusetts Institute of Technology. A copy of my c.v. is attached to this report (Attachment 1). I have not been compensated beyond my government salary for this report.

The Department of Justice has asked me to review data on government contracting to assess the relationship between contracting outcomes for small businesses and the type of ownership of these businesses. As discussed in more detail below, I analyzed data on government contracts for small businesses for FY 2012 and looked at whether, holding constant various factors that might influence the award of a contract, firms that were “small disadvantaged businesses” (SDBs) were more or less likely to win federal prime contracts relative to the other small businesses.

SDBs are businesses that are 51% or more owned and controlled by one or more disadvantaged persons; the disadvantaged person or persons must be socially disadvantaged and economically disadvantaged; and the firm must be small, according to SBA’s size standards. Since October 2008, qualified small businesses can self-certify as SDBs. See SBA SDB Definitions (available at <http://www.sba.gov/content/disadvantaged-businesses>). SDBs are generally (but not always) owned by persons belonging to groups presumed to be socially disadvantaged (i.e., Blacks, Hispanics, Asians, and Native Americans).

Some SDBs are also part of the SBAs 8(a) Business Development Program. The 8(a) program was created to help small-disadvantaged businesses compete in the marketplace and to assist them in gaining access to Federal and private procurement markets. To be admitted to the program, a company must meet the eligibility criteria set out in 13 CFR Part 124, including (1) the size criteria to be a small business established in SBA regulations, and (2) the requirement that majority owners be economically and socially disadvantaged individuals. 8(a) businesses are generally (but not always) owned by persons belonging to groups presumed to be socially disadvantaged (i.e., Blacks, Hispanics, Asians, and Native Americans). Participants in the 8(a) program receive special consideration for Federal contracts. For example, procuring agencies can limit contract competitions to 8(a) firms or award contracts on a sole-source basis to 8(a) firms as long as the contract does not exceed certain limits (up to \$6.5 million for contracts involving manufacturing and up to \$4 million for other contracts). See SBA 8(A) Program

Description (available at <http://www.sba.gov/content/about-8a-business-development-program>).

Alaska Native Corporations may also participate in the Section 8(a) program and are exempt by statute and/or regulation from the cap on sole source contract awards, the competitive threshold limits on sole source contracts and the number of firms ANCs may own. See 13 CFR 124.519.

Finally, some small businesses that bid on federal contracts are owned by Blacks, Hispanics, Asians, and Native Americans do not register as SDBs and are not part of the 8(a) program.

Overview of Results

Below I estimate the “odds ratio” for non-8(a) SDBs and I find that, holding constant factors such as the size and age of the firm, its legal form of organization, and its level of government security clearance, the odds of winning a contract for SDBs not participating in the 8(a) business development program are estimated to be roughly 11 percent lower relative to the odds of winning contracts by firms that were not identified as SDBs. This difference is statistically significant at the 95 percent significance level. Minority owned firms (which include minority-owned small businesses, SDBs that are minority-owned and minority-owned 8(a) participants) had roughly 30 percent lower odds of winning a contract than other small firms.

Unsurprisingly, firms that participate in the 8(a) program, a program in which firms generally do not have to engage in a full and open competition for contracts, but rather are awarded contracts through sheltered bidding or on a sole-source basis, had odds of winning contracts that were many times higher relative to the odds of winning contracts by other small businesses. Similarly, other types of firms that the federal government allows to participate in sheltered competition programs in prime contracting, such as those owned by service-disabled veterans or those located in Historically Underutilized Business Zones (HUBZones), also appear have increased to odds of winning contracts relative to the odds of firms without such characteristics.

I also looked at whether the effects of these programs or the effects of different types of ownership vary depending on the industry in which a contract is won. The results for each industry individually are very similar to those estimated using all of the data in the sample. On an industry-by-industry basis, I find that in virtually every industry, the odds of non-8(a) SDBs winning contracts, all else equal (size, age, legal organization, level of government clearance), were lower than the odds of other non-SDB small firms winning contracts, though in only about half of the industries are these odds lower in a statistically significant sense (that is, the relationship is estimated precisely enough that I can say with a degree of confidence that the odds ratio is different from one, the ratio that implies the odds of SDB firms winning contracts was the same as the odds of other small firms winning). However, the industries where the relationship is statistically significant represent the vast majority of contracts awarded in 2012. As Table 4 on page 15 demonstrates, SDBs are statistically significantly less likely to win a contract in industries accounting for 82.5% of contract actions, 67.1% of dollars awarded, and where 72.7% of SDBs are registered. There is no industry where SDBs have a statistically significant advantage in terms of winning a contract from the federal government. As Table 4(a) on page 14 demonstrates, minority owned firms (which include minority owned small

businesses, SDBs that are minority-owned and minority owned 8(a) participants) are statistically significantly less likely to win a contract in industries accounting for 68.6% of contract actions, 81.1 % of dollars awarded, and where 84.3% of minority owned businesses are registered. There is no industry where minority owned businesses have a statistically significant advantage in terms of winning a contract from the federal government.

Data

This report focuses on contracting outcomes for minority-owned firms with particular emphasis on SDBs, a sub-group of minority-owned firms. Firms self-certify their SDB status when they register to bid on contracts (as described below).

Table 1 summarizes the owner characteristics of SDB firms using 2012 data. The data used in this report contain information on 43,606 SDBs, of which roughly two thirds are self-identified as minority-owned. Another 15 percent are non-minority women-owned, and 5.5 percent are located in HUB-Zones or are veteran-owned. The remaining 15 percent of SDBs do not self-identify as minority-owned, nor do they self-identify as belonging to any other specially identified group.

My goal is to look at contracting outcomes among SDBs compared to other small firms, distinguishing between the SDBs that do and do not participate in the 8(a) program. In order to do this, I construct a database of firms that might reasonably have been expected to compete for Federal contracts, along with information on which of these firms actually won contract awards. In this database, I also have information on firm characteristics (such as size and age) as well as information identifying which firms are SDBs, which are 8(a) participants, and whether their owner belongs to another specially identified group for which the federal government has contracting goals.

Data on Entities Registered to Compete for Federal Prime Contracts

All firms that wish to compete for Federal contracts must register as potential contractors. This involves filling out a form on-line using the System for Award Management (SAM) which is operated by the General Services Administration (GSA) of the U.S. federal government.¹ Because there is no fee it is a low-cost way for a firm to self-identify as potentially interested in competing for Federal contracts. Registration in SAM must be re-certified each year.²

¹ www.sam.gov

² Obviously, given this data set, this report does not attempt to measure whether there are other businesses that potentially could contract with the federal government and the odds ratios that one would see if such businesses were included in the analysis.

Table 1

Owner Characteristics Among All Small Disadvantaged Businesses		
	Number of SDBs	Percent of SDBs
Grand Total	43,606	100.0%
Total Minority*	28,234	64.7%
Black	12,104	27.8%
Hispanic	6,956	16.0%
Asian Pacific	3,473	8.0%
American Indian or Alaska Native	2,532	5.8%
Asian Subcontinent	2,200	5.0%
Not classified	969	2.2%
Non-Minority Female-Owned	6,393	14.7%
Non-Minority Male-Owned	8,979	20.6%
Non-Minority Male-Owned in Other Special Categories**	2,383	5.5%
Non-Minority Male-Owned not in Other Special Categories	6,596	15.1%

*Minority categories may overlap.

**Firms in Other Special Categories are those located in HUBZones, are Service Disabled Veteran-Owned, or Other Veteran-Owned

Firms that register in SAM must indicate the industries in which they are able to provide goods and services, using the six-digit North American Industry Classification (NAICS) codes. (NAICS is a hierarchical classification system in that as more digits are added to the code, the industry classifications become more narrowly defined – and more sparsely populated. Below I use codes at the three-digit level as a compromise balancing the need to have sufficient data in each industry grouping and the recognition that many firms can switch production within the broader three-digit category.) These data also include self-reported information from the firm on numbers of employees; average sales over the past three years; the year the firm was founded; selected socioeconomic characteristics of owners (e.g., whether the firm was owned by a woman and whether the firm is owned by a member of a minority group); and firm location. (In this report I use the term “three-digit NAICS code” or just “NAICS code” interchangeably with the term “industry.”) Firms can identify themselves as operating in multiple industries, so when the data are analyzed on an industry basis, entities can appear in the data set multiple times.

Data on Contractors and Contract Awards

Contract awards (as well as modifications and orders) from prime contracts awarded by federal Executive Branch agencies must be reported in the Federal Procurement Data System (FPDS),

which is administered by the General Services Administration and publicly available for download from www.usaspending.gov.³ These data provide two broad types of information. First, the data include contract action characteristics, such as the agency awarding the contract; the six-digit industry NAICS code of the product or service procured by the agency under the contract action; the dollars obligated (or de-obligated) under the contract action; and the place of performance. Second, the data include contractor characteristics (such as company name and identification number). Each record in the FPDS represents a single contract action. For purposes of this report, I define a firm as “winning” contracts in an industry in FY 2012 if it had at least one contract with net obligations greater than zero dollars in that industry.

SBA Data Defining Program Eligibility and Size Parameters

SBA provided data on firms that were in its 8(a) and/or HUBZone programs (in FY 2012, no other specially identified group was certified by SBA⁴) and I matched these to the FPDS and SAM matched data set using DUNS numbers in the SBA data. DUNS number is a company identifier maintained by Dun & Bradstreet that registrants use in order to register in SAM. (All other specially identified groups were self-identified in the SAM data.) I also obtained from SBA its specific definitions for ‘small business’, which vary across six-digit NAICS codes.⁵ The analysis in this report looks only at small businesses as defined by SBA within each individual industry. When I define a firm as a small business, it is based on these industry-specific definitions. Because size distinctions vary across industries, a firm might be considered a small business in one industry but not in another.

I chose to analyze the data at the parent company level, even though sub-units within the larger parent company may be doing the actual bidding.⁶ These data were analyzed at the parent company level because the purpose of this report is to identify and measure potential differences in contracting outcomes based on race/ethnicity of the owner and because no information is available about the characteristics of the managers of sub-units that compete for contracts.

Data on Firms Registered for Contracts and Firms that Won Contracts

I obtained archived SAM data from GSA in two data sets current as of July 2012. One is for official use only (FOUO) and contains registrants’ DUNS number.⁷ Commercial and Government Entity (CAGE) codes (used to uniquely identify entities registered in the SAM data) and DUNS numbers were extracted from the FOUO data, which contains data on entities actively registered in SAM as of July 25, 2012 (plus six months worth of expired registration data which were discarded). The FOUO data set also contains information about the form of organization of registrants and what level of security clearance they report.

³ I obtained these FPDS data from Bloomberg Government as described below.

⁴ Women-owned businesses that meet certain size criteria can be part of the 8(m) program which is similar to the 8(a) program. However, whether a woman-owned business was part of this program was not included in the SBA data file.

⁵ See <http://www.sba.gov/content/summary-size-standards-industry> for a summary of the size standards.

⁶ Note that the terms “company,” “firm”, and “parent” are used interchangeably throughout this report and that these entities can include non-profit organizations as well as private-sector, for-profit entities.

⁷ Note that a registrant may have more than one DUNS number corresponding to headquarters or various levels of company parentage.

The other SAM data set obtained from GSA is called the FOIA (for Freedom of Information Act) file (current versions of the FOIA file are available for public download from www.sam.gov). The FOIA file used here contains all entities actively registered in SAM as of July 15, 2012. From this file certain data elements were extracted, including NAICS codes, business start date, and average number of employees, annual receipts, and business types. Business types are data on ownership or status of the businesses reported for each registrant, including SDB status; the race and ethnicity of the registrant (or with which the registrant is affiliated); minority-ownership; woman ownership; service-disabled veteran ownership; and other veteran ownership.⁸ Certain NAICS industry groups were dropped because of incomplete data, irrelevance, or because data issues in a given NAICS group prevented the regression model from producing reliable estimates (see table 2 below), leaving 80 NAICS industry groups included in the analysis.⁹ Registrants with missing or zero annual receipts or employment or with unrealistically large values of size or age were dropped.

I also obtained from GSA a list as of September 30, 2012 of firms that were excluded from doing business with the federal government (current lists of such firms are also available for public download from www.sam.gov). I matched these firms by DUNS number to the other SAM data sets and dropped from the analysis the small number of firms (190) that were on the exclusions list.

⁸ Business types also identify if the registrant is only interested in grants and not contracts; located outside of the US; a government entity; and/or an international organization. All of the firms of these types were dropped from all datasets used in my analysis.

⁹ Such problems include cases in which the SDB variable was automatically dropped from the analysis because it was collinear with another variable or when certain values of the SDB variable perfectly predict contracting outcomes, thereby preventing the model from estimating a meaningful relationship between the variables. In the industry-level regressions in this report, odds ratios could not be estimated for some of the variables because certain values of the variables perfectly predicted contracting outcomes (with the corresponding observations dropped from the analysis). For technical details see *Stata Base Reference Manual Volume 2: Release 12*. Stata Press, 2011, at pp. 973-975.

Table 2

Three-digit NAICS Codes Dropped from Analysis:¹⁰

Code	Description	Reason Dropped
221	Utilities	SBA small business definition for electric power generation is based on capacity in megawatt hours which were not available in the SAM data files.
482	Rail Transportation	No non-8(a) SDB won a contract, therefore non-(8) SDB variable dropped from analysis.
486	Pipeline Transportation	No non-8(a) SDB won a contract, therefore non-(8) SDB variable dropped from analysis.
487	Scenic and Sightseeing Transportation	No non-8(a) SDB won a contract, therefore non-(8) SDB variable dropped from analysis.
491	Postal Service	This industry only consists of one entity – the US Postal Service
521	Monetary Authorities – Central Bank	This industry only consists of one entity – the Federal Reserve System.
522	Credit Intermediation	SBA small business definitions for some industries are based on assets, which were not available in the SAM data files.
525	Funds, Trusts and Other Financial Vehicles	No non-8(a) SDB won a contract, therefore non-(8) SDB variable dropped from analysis.
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	No non-8(a) SDB won a contract, therefore non-(8) SDB variable dropped from analysis.
551	Management of Companies and Enterprises	No contracts were awarded in this industry.
814	Private Households	No SBA small business definition.
921-928	Public Administration	No SBA small business definition.

The data extracted from the FOUO and FOIA data sets were matched and merged to each other by CAGE code. These data were then matched by DUNS number to the 8(a) and HUBZone data sets to identify which of the SAM firms were participants in the 8(a) program or were certified to be HUBZone firms.

I obtained from Bloomberg Government a data extract drawn from the Federal Procurement Data System (FPDS) for contracts covered by Federal prime contracting goals for various specially

¹⁰ Five distinct categories of contracting had zero total contracts awarded to non 8(a) SDBs: 482 Rail Transportation, 486 Pipeline Transportation, 487 Scenic and Sightseeing Transportation, 525 Funds, Trusts and Other Financial Vehicles, and 533 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works). Because of the formula used in the analysis in this report, these NAICS codes could not be included as no non-8(a) SDBs won a contract in any of these codes in 2012, despite the fact that there were non-8(a) SDBs registered to do business in each of these codes. The fact that these codes could not be included in the analysis does not mean that SDBs are successful in these industries; in fact, given the complete lack of any non-8(a) SDB winning a contract, the converse could be concluded.

identified groups (small businesses; small disadvantaged businesses; woman-owned small businesses; etc.).¹¹ Bloomberg aggregated net contract obligations in the data up to the contract identification number/set-aside program (if any)/three-digit NAICS level and included DUNS numbers. The Bloomberg file also included the start date of each contract so that I could identify contracts that started in FY 2012 (contracts starting before FY 2012 were dropped from the analysis). Matching the FPDS data to the data on firms in SAM (using DUNS numbers) allowed me to determine which of the firms registered for government contracts actually won one or more contracts with net positive contract obligations in 2012. About 7 percent of the records in the FPDS data did not match to the SAM data and were dropped from the analysis. This should not affect this report's conclusions.

As mentioned above, contractor records were combined by the ultimate (i.e., highest level of parentage) DUNS number, as well as at the three-digit NAICS code level, thus retaining a count of the contracts awarded to each parent within each three-digit NAICS code. The specially identified group indicators, age, and size variables often vary across registrants that belong to a given parent entity with the same ultimate DUNS number, raising issues about how to treat these measures when observations are aggregated to the parent company level. Thus, I defined specially identified group status among parent firms in two different ways:

1. Least inclusive: assign a parent to a specially identified group only if *all* its sub-entity records indicate group membership.
2. Most inclusive: assign a parent to a specially identified group if *at least one* of its sub-entity records indicates group membership.

¹¹ "Q12. When calculating the percentages in the Goaling reports, the Small Business Administration determined that the counts of actions and sums of obligated dollars for certain actions shall be excluded.

The following categories of contracts are not included in the "base" amount:

- Javits-Wagner O'Day Program (JWOD, Sheltered Workshops)
- UNICOR or Federal Prison Industries
- American Institute in Taiwan
- Contracts awarded and performed outside the United States
- Acquisitions by Agencies on behalf of foreign governments or entities or international organizations
- Contracts funded predominately with agency generated sources.

Accordingly, the following Government Agencies are excluded:

- FDIC
- Postal Service
- Bureau of Engraving and Printing
- United States Mint
- Office of the Comptroller of the Currency
- Office of Thrift Supervision
- Transportation Security Administration
- Federal Aviation Administration
- Tennessee Valley Authority
- Defense Commissary Agency contracts are excluded because they are buying for resale in a military commissary.
- Quasi-government agencies operating with non-tax dollars (known as non-appropriated funds) that were not competed because the products they purchase are being bought to be resold. The money the agency gets from the sale fund the operation of the organization."

("Frequently Asked Questions About FPDS-NG" http://www.acquisition.gov/fags_whataboutfpds.asp#q12)

I also assigned age, sales receipts, and employment values to each parent company in two ways:

1. Minimum: the minimum of each of age, sales receipts, and employment values across all sub-entities within the parent firm (regardless of the NAICS codes in which they registered).
2. Maximum: the maximum of each of age, sales receipts, and employment values across all sub-entities within the parent firm (regardless of the NAICS codes in which they registered).

Finally, I assigned small business status to parent companies in two ways¹²:

1. Least inclusive: For each six-digit NAICS code in which a parent or sub-entity registered, determine its size status based on its NAICS code and either its maximum sales receipts or employment values, using the appropriate regular NAICS-code specific SBA size standards. Then assign small status to a parent only if all its sub-entity records indicate group membership.
2. Most inclusive: For each six-digit NAICS code in which a parent or sub-entity registered, determine its size status based on its NAICS code and either its minimum sales receipts or employment values, using the appropriate NAICS-code specific SBA size standards (or size standard exceptions for the small number of NAICS codes with such exceptions). Then assign small status to a parent if at least one of its sub-entity records indicates group membership.

The results discussed below are based on the “least inclusive” (first) methods described here, but using the other (second) methods would not change the results in any meaningful way. Including large firms (i.e. firms that were too large to meet the SBA definition of a small business) also did not change the results in any meaningful way.

Model Specification and Results

The ultimate question of interest here is whether the data show any difference in the odds of contracts being won by minority-owned small businesses, particularly those identified as SDBs and those that are part of the 8(a) program, relative to other small businesses. Regression analysis is a tool used by economists to address this type of question. This type of analysis starts with a hypothesis about the relationships between various variables and estimates whether these variables interact with each other in a way that is consistent with the hypothesis. There are many types of regression analyses, but the logit model is widely used to analyze the odds of an event occurring, such as a firm being awarded a contract, and it is this type of model that is used in the analysis described here.

This model assumes that there is a relationship between a variable to be explained (the

¹² A relatively small number of firms won contracts in three-digit NAICS codes in which they had not registered in SAM. Since I did not have the six-digit NAICS codes for these firms I modified the size determination method by using the minimum size standard across all six-digit NAICS codes within each three-digit NAICS code for the least inclusive method and the maximum for the most inclusive method.

“dependent” variable) and one or more explanatory (“independent”) variables. The standard way to represent this model is:

$$Y = \exp(\beta * X + \varepsilon)$$

In this example, the dependent variable is represented by Y, X is one or more independent variables that explain the dependent variable, and $\exp(.)$ is the exponentiation function. The β is an unknown parameter or set of parameters that is to be estimated and gives the degree to which an independent variable is related to a dependent variable. The final term in the equation, represented by ε , is known as the error term and represents the other elements that might influence the dependent variable but which are not explicitly included in the estimation. The error term “arises for several reasons, primarily because we cannot hope to capture every influence on an economic variable in a model, no matter how elaborate.”¹³

A key feature of a regression is that it allows the researcher to isolate the effects of one independent variable on the dependent variable separately from the other independent variables. In other words, the first β that is estimated in an equation represents the relationship between Y and the first X variable *holding constant* all the other independent variables. As an example, regression analysis could be used to examine how characteristics of a home affect the sales price of a home. To do this, one might hypothesize that the value of a home depends on factors such as the number of bedrooms in a house, the number of bathrooms and the size of the lot on which the house is found. Then, the β that is associated with the number of bedrooms is a measure of how increasing the number of bedrooms affects the sales price holding constant the number of bathrooms and the size of the lot.

Another key to successfully estimating regressions and to draw the proper inferences from the results is to make sure that the appropriate variables are included in the model. For example, it may often be the case that a house with more bedrooms is also likely to have more bathrooms. If a regression of housing prices only includes the number of bedrooms it may overstate the influence of the number of bedrooms on prices as the estimate of the β associated with the number of bedrooms also will include the influence of the number of bathrooms on prices.

In the present context, the dependent variable represents whether or not the firm wins a contract, while the independent variables are all the measures that influence the odds of whether or not a given firm wins a contract. When estimating this model, as with the housing example discussed above, it is important to include other variables that might also influence whether a minority-owned small business wins a contract or not. For example, it might be the case that newer firms are less likely to win contracts, on average, than older firms. Thus, it would be important to include a measure of the age of the firm in the model to control for this fact. This is particularly important if it also happens to be the case that minority firms are more likely to be newer than other firms; in this situation, if the age of the firm is not included in the model, one might conclude that minority firms are winning fewer contracts, on average, when, in fact, it is younger firms that are winning fewer contracts.

Here, the independent variables I use are the ownership of the firm (minority-owned, women-owned, and veteran-owned); the type of organization (that is, whether the firm is a corporation, a partnership or some other type); other characteristics of the firm (size, in terms of number of employees and revenues, level of security clearance of the firm and age of the firm); and whether

¹³ Greene, William H., *Econometric Analysis*, Sixth Edition, Pearson Education, 2008 at p. 9.

the firm identifies itself as an SDB and, if so, whether the firm is part of the SBA's 8(a) program.

Table 3 lists estimates of the "odds ratios" of the independent variables listed above, holding the other variables constant. Not surprisingly, there is a positive and significant increase in the odds of a small firm winning a contract as the age of the firm and the size of the firm, measured either by sales or number of employees, increases.¹⁴ Firms with various levels of security clearance also had higher odds of winning contracts than firms that did not report having a security clearance level, with the largest effect resulting for those firms with "secret" clearance; the odds of a firm with a secret clearance winning a contract were 55 percent higher than those without a secret clearance. Ownership structure can also influence the odds of a small firm winning a contract, with the odds of corporations and partnerships winning contracts being lower and the odds of sole proprietorships winning being higher than other forms of organization.

The main variables of interest, however, are the ones at the top of the table, which relate to the type of ownership of the small business and whether the firm participates in one of the SBA programs that are designed to help small businesses win contracts. Controlling for other factors, the odds of minority-owned small firms and non-8(a) SDB firms¹⁵ winning contracts were lower than small non-minority and non-SDB firms; specifically, the odds of an SDB firm winning a contract is roughly 11 percent lower than other types of small businesses, while small minority-owned firms, regardless of whether they are SDBs or in the 8(a) program, had roughly 30 percent lower odds of winning a contract than other firms.¹⁶

These relationships, as in all regression models, are estimated with some degree of error. Thus, it is common practice to estimate whether, given this degree of error, it is possible to distinguish the estimate from some fixed value (usually zero) with a high degree of certainty or whether it is just chance that makes the estimate different from this fixed value. That is, I am interested in whether these estimated relationships are "statistically significant." With odds ratios, the estimate is statistically significant if it can be distinguished, with a high degree of certainty, from one, the point where the odds of the two groups compared are the same. If the estimate cannot be distinguished from one with enough certainty, then I cannot say that the odds of winning of contract for one group are different the odds of another group winning a contract.

Whether an estimate of a statistical relationship between two variables is significant is a function of two things – how close the estimate is to the value that would indicate no relationship and the precision of the estimate. One of the key factors in the degree of precision of estimates of relationships between two variables is the number of observations used to

¹⁴ Note that SDBs have a lower mean age (11.8 years) compared to non-SDBs (19.2 years). Generally SDBs are smaller than non-SDBs on average: mean sales are \$2.9 million compared to \$8.1 million; median sales are \$0.8 and \$0.5 respectively. However, the mean number of employees for SDBs is slightly bigger (446) than the mean for non-SDBs (424), but the median number of employees for SDBs (5) is lower than that for non-SDBs (6).

¹⁵ There are 70,615 minority owned firms of which 28,234 (40%) are SDBs and there are 43,606 SDBs of which 28,234 are minority owned (65%).

¹⁶ The odds ratio for firms that both identified themselves as SDBs (but that were not part of the 8(a) program) and that were small minority-owned firms is the product of the SDB non-8(a) odds ratio and the minority-owned odds ratio, or $(0.886) * (0.694) = 0.615$.

estimate a model; generally, the more observations, the more precise is the estimate.¹⁷ The measures of precision are represented by the “standard errors” of the estimates, which in Table 3 are the numbers in parentheses below the estimates of the odds ratios.

Typically, when assessing statistical significance, it is common to look at roughly two standard errors above and two standard errors below the relevant estimate to determine the range within which one is confident the true estimate lies. For the estimate of the SDB odds ratio, the standard error is estimated to be 0.015 so I am confident that the true value lies somewhere between 0.866 and 0.916 (0.886 plus or minus two times 0.015). Therefore, I can say that the estimate of the odds of an SDB winning a contract is significantly less than one (i.e. the fact that the odds of an SDB firm winning a contract is estimated to be lower than odds for other firms is not due to chance.) Given the relatively large number of observations, the standard errors in Table 3 are all small relative to the size of the estimated odds ratios and, thus, most of the estimated odds ratios are statistically significant; the ones that are not are those that are estimated to be close to one (e.g. the odds ratio estimated for firms that are corporate not tax-exempt is 0.996 which is not statistically significantly different from one.) The other estimates in Table 3 show that firms in the 8(a) program, firms that were certified as being HUBZone businesses or firms owned by service-disabled veterans had larger odds of winning a contract, likely due to their participation in the Section 8(a) set-aside program or similar contracting programs. These results hold even when certain variations of the model are estimated. For example, the same basic relationship between SDBs and the winning of contracts is found when the SDB sample excludes 8(a) firms and 8(a) set aside contracts or includes variables that control for the geographic location of the small business.

Table 4 provides a summary of the results when the same model is estimated separately for each three-digit NAICS code and Table 5 provides a more detailed list of the industry-by-industry estimates (Table 6 defines the NAICS codes used in Table 5). As can be seen from Table 4, in virtually every industry, the odds of non-8(a) SDBs winning contracts are lower, all else equal, than other firms. In only about half of the industries are the odds ratios for non-8(a) SDBs winning contracts statistically significantly lower; however, the industries where the relationship is statistically significant represent the majority of contracts won in 2012.¹⁸ Table 4(a) shows the same information for minority owned firms.

As mentioned above, how close the estimate is to one and the sizes of the standard errors (which, in turn, depend largely on the number of observations used in a regression,) are the key factors in determining the statistical significance of the odds ratios. In Table 6, there are 21 three digit NAICS code industries with at least 9,000 observations and in 18 of these the estimate of the odds ratio on SDBs is statistically significant, ranging from 0.48 to 0.84. On the other hand, the three industries with more than 9,000 observations that are not statistically significant, NAICS codes 236, 237 and 621, all have estimated coefficients that are relatively close to one (0.921, 0.927 and 0.86, respectively). At the same time, there are 21 three digit NAICS code industries

¹⁷ To illustrate this point, if you flipped a coin 10 times and got 7 heads, you might think the coin is biased, but the number of observations prevents you from drawing that conclusion with certainty. If you flip the same coin 10,000 times and get heads 7,000 times, you can conclude that it is highly likely that the coin is biased.

¹⁸ The two three digit NAICS code category where the coefficient on the SDB variable was positive, though not significant, were 454 (Nonstore Retailers) and 483 (Water Transportation). There are 5,355 firms registered to serve these NAICS codes but there were only 719 contracts entered into in 2012 in these industries.

in the analysis that have fewer than 2,000 observations and in only seven of these 21 is the odds ratio on the SDB variable statistically significant (and in all seven of these the estimated odds ratio is less than 0.5).

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Table 3
Pooled Regression Results

	Odds Ratios
SDB not 8(a)	0.886*** (0.0151)
8(a)	5.141*** (0.148)
woman-owned	0.927*** (0.0105)
minority-owned	0.694*** (0.00972)
hubzone	1.573*** (0.0424)
service-disabled veteran	1.325*** (0.0292)
other veteran	1.026 (0.0167)
log age	1.203*** (0.00614)
log employment	1.164*** (0.00390)
log receipts	1.026*** (0.00168)
sole proprietor	1.118*** (0.0178)
(omitted: "other " orgs)	0.696*** (0.0127)
partnership	0.990 (0.0110)
corporate not tax-exempt	0.263*** (0.00687)
corporate tax-exempt	1.221*** (0.0261)
Government non-classified	1.419*** (0.0688)
(omitted: no security reported)	1.555*** (0.0447)
Government confidential	1.071** (0.0320)
Government secret	0.0809*** (0.00193)
Government top secret	373,057
Constant	0.0507
No. Observations	
pseudo R2	
Robust standard errors in parentheses	

Table 4**Summary Results from Industry Regressions: Difference in Odds of Non-8(a) SDBs Winning Contracts**

	Contracts		Awards		Non-8(a) SDBs*		Industries	
Lower odds statistically significant	286,300	85.2%	\$18,638,714,880	67.1%	106,467	72.7%	37	46.3%
Lower odds not statistically significant	48,870	14.6%	\$9,010,878,464	32.5%	39,170	26.7%	41	51.3%
Higher odds statistically significant	-	0.0%	\$ -	0.0%	-	0.0%	0	0.0%
Higher odds not statistically significant	717	0.2%	\$115,715,432	0.4%	873	0.6%	2	2.5%
Totals	335,887	100.0%	\$27,765,308,776	100.0%	146,510	100.0%	80	100.0%

*SDBs are counted once for each industry in which they are registered or won contracts. Percents may not sum to 100% due to rounding.

Table 4a**Summary Results from Industry Regressions: Difference in Odds of Minority-Owned Businesses Winning Contracts**

	Contracts		Awards		Minority-Owned Businesses*		Industries	
Lower odds statistically significant	230,491	68.6%	\$22,528,989,184	81.1%	161,055	84.3%	43	53.8%
Lower odds not statistically significant	103,790	30.9%	\$5,193,522,688	18.7%	27,862	14.6%	33	41.3%
Higher odds statistically significant	-	0.0%	\$-	0.0%	-	0.0%	0	0.0%
Higher odds not statistically significant	1,606	0.5%	\$42,798,332	0.2%	2,051	1.1%	4	5.0%
Totals	335,887	100.0%	\$27,765,310,204	100.0%	190,968	100.0%	80	100.0%

Table 5: Industry-Specific Regression Results

	111	112	113	114	115	211	212	213	236	237	238
SDB not 8(a)	0.464 (0.255)	0.177 (0.192)	0.295** (0.170)	0.524 (0.407)	0.635*** (0.0769)	0.981 (1.204)	0.668* (0.154)	0.414** (0.167)	0.921 (0.0651)	0.927 (0.0765)	0.807*** (0.0383)
8(a)			0.503 (0.531)		1.544** (0.316)		1.427 (0.524)	0.859 (0.560)	9.050*** (0.691)	8.096*** (0.759)	8.018*** (0.474)
woman-owned	0.789 (0.248)	1.306 (0.458)	0.590 (0.239)	1.754 (0.867)	0.945 (0.0846)	0.500 (0.314)	0.867 (0.160)	0.862 (0.257)	0.910 (0.0546)	0.764*** (0.0534)	0.838*** (0.0313)
minority-owned	0.572 (0.243)	0.968 (0.497)	0.906 (0.366)	1.996 (1.096)	0.913 (0.102)	0.299* (0.213)	0.572*** (0.122)	1.421 (0.462)	0.791*** (0.0513)	0.542*** (0.0432)	0.658*** (0.0298)
hubzone	0.552 (0.564)		0.215** (0.157)		1.519*** (0.165)		0.693* (0.138)	0.380 (0.235)	1.878*** (0.134)	2.744*** (0.181)	1.406*** (0.0766)
service-disabled veteran	0.560 (0.423)		0.416 (0.433)	0.857 (0.902)	0.673** (0.131)	1.666 (1.412)	0.648 (0.223)	1.661 (0.701)	2.664*** (0.176)	1.457*** (0.129)	1.603*** (0.0839)
other veteran		1.420 (0.598)	0.725 (0.377)	0.746 (0.567)	0.829 (0.110)		0.637 (0.191)	0.596 (0.303)	0.811* (0.0874)	0.856 (0.0954)	0.943 (0.0526)
log age	1.167 (0.112)	1.642*** (0.238)	0.923 (0.116)	1.122 (0.236)	1.154*** (0.0484)	1.069 (0.382)	1.175** (0.0928)	2.204*** (0.367)	1.004 (0.0292)	1.214*** (0.0427)	1.161*** (0.0209)
log employment	1.144* (0.0790)	1.055 (0.0874)	1.264*** (0.104)	0.712 (0.189)	1.038 (0.0332)	1.133 (0.238)	1.027 (0.0641)	1.444*** (0.132)	1.096*** (0.0213)	0.991 (0.0262)	1.088*** (0.0136)
log receipts	0.988 (0.0313)	1.048 (0.0546)	0.983 (0.0351)	1.169 (0.136)	1.009 (0.0114)	0.962 (0.0655)	1.004 (0.0255)	1.006 (0.0511)	1.075*** (0.0137)	1.058*** (0.0154)	1.034*** (0.00673)
sole proprietor	1.269 (0.419)	0.776 (0.288)	0.795 (0.262)	1.570 (0.973)	1.124 (0.112)		1.144 (0.278)	0.865 (0.515)	0.833* (0.0849)	1.238** (0.131)	0.891** (0.0521)
(omitted: "other " orgs)											
partnership	0.584 (0.247)	0.440* (0.208)	0.384* (0.213)	1.022 (0.807)	0.847 (0.118)	0.691 (0.849)	0.800 (0.208)	0.788 (0.457)	0.894 (0.0797)	0.891 (0.100)	0.833*** (0.0523)
corporate not tax-exempt	1.288 (0.423)	0.860 (0.324)	0.770 (0.225)	1.144 (0.620)	0.946 (0.0900)	0.822 (0.659)	0.851 (0.125)	1.274 (0.349)	0.888** (0.0478)	0.895* (0.0545)	0.892*** (0.0313)
corporate tax-exempt	0.158* (0.165)	0.326 (0.258)		1.407 (1.182)	0.187*** (0.0619)			2.315 (1.671)	0.0973*** (0.0440)	0.446** (0.177)	0.651** (0.119)
Government non-classified (omitted: no security reported)	0.631 (0.693)		0.718 (0.743)	1.063 (1.236)	0.591** (0.158)		0.865 (0.329)	1.782 (0.800)	1.254** (0.111)	0.996 (0.115)	1.331*** (0.0822)
Government confidential											
Government secret		2.913 (3.321)			0.801 (0.507)			1.665 (2.175)	1.506** (0.294)	1.105 (0.296)	1.357*** (0.198)
Government top secret					0.543 (0.294)	9.797 (16.17)	2.318 (1.351)	5.216*** (3.290)	0.887 (0.133)	0.679* (0.144)	1.171 (0.130)
Constant	0.0535*** (0.0260)	0.0121*** (0.00944)	0.0622*** (0.0305)	0.00921*** (0.0133)	0.119*** (0.0195)	0.0969** (0.0996)	0.108*** (0.0397)	0.00245*** (0.00207)	0.0183*** (0.00312)	0.0184*** (0.00351)	0.0399*** (0.00369)
No. Observations	1,516	1,266	2,280	522	6,816	179	2,586	1,752	30,198	24,954	59,316
pseudo R2	0.0400	0.0572	0.0451	0.0406	0.0221	0.0822	0.0269	0.135	0.129	0.0874	0.0615

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	311	312	313	314	315	316	321	322	323	324	325
SDB not 8(a)	0.824 (0.198)	0.722 (0.276)	0.792 (0.225)	0.731* (0.119)	0.831 (0.146)	0.642 (0.199)	0.860 (0.161)	0.679** (0.126)	0.583*** (0.117)	0.547** (0.136)	0.954 (0.106)
8(a)	1.273 (0.868)		0.742 (0.626)	1.772** (0.511)	1.067 (0.356)	4.203*** (2.174)	0.783 (0.333)	0.883 (0.334)	1.419 (0.537)	0.466* (0.215)	2.073*** (0.480)
woman-owned	0.857 (0.141)	0.525* (0.200)	1.093 (0.202)	0.888 (0.0947)	0.850 (0.108)	0.898 (0.196)	1.008 (0.130)	1.056 (0.140)	0.721*** (0.0877)	0.818 (0.158)	1.028 (0.0826)
minority-owned	0.394*** (0.0772)	1.352 (0.450)	0.779 (0.184)	0.828 (0.121)	0.757* (0.119)	0.787 (0.216)	0.574*** (0.112)	0.868 (0.147)	0.759* (0.124)	0.761 (0.159)	0.632*** (0.0654)
hubzone	1.052 (0.380)	1.811 (1.291)	0.808 (0.314)	1.785*** (0.338)	0.990 (0.231)	1.082 (0.431)	1.217 (0.267)	1.044 (0.268)	1.149 (0.397)	0.765 (0.235)	0.975 (0.175)
service-disabled veteran	0.898 (0.300)	0.584 (0.378)	0.855 (0.347)	1.080 (0.208)	1.022 (0.234)	1.456 (0.536)	0.824 (0.202)	1.291 (0.307)	1.014 (0.260)	0.732 (0.240)	1.181 (0.165)
other veteran	1.172 (0.297)	0.982 (0.453)	0.832 (0.246)	1.087 (0.162)	1.086 (0.190)	1.308 (0.353)	0.700* (0.144)	0.847 (0.168)	0.934 (0.179)	0.648 (0.172)	1.015 (0.107)
log age	1.139** (0.0738)	1.405** (0.195)	1.475*** (0.135)	1.151*** (0.0582)	1.241*** (0.135)	1.173 (0.123)	1.410*** (0.0982)	1.253*** (0.0823)	1.124* (0.0690)	1.445*** (0.112)	1.440*** (0.0528)
log employment	0.981 (0.0670)	1.066 (0.106)	1.239*** (0.0792)	1.288*** (0.0524)	1.270*** (0.0591)	1.160* (0.0952)	0.991 (0.0514)	1.155*** (0.0583)	1.226*** (0.0609)	1.054 (0.0634)	1.178*** (0.0320)
log receipts	1.169*** (0.0571)	1.047 (0.0434)	1.006 (0.0291)	1.034* (0.0208)	1.078*** (0.0295)	1.104* (0.0617)	1.042 (0.0301)	1.019 (0.0251)	1.011 (0.0258)	1.053* (0.0324)	1.040*** (0.0131)
sole proprietor (omitted: "other " orgs)	0.919 (0.276)	1.251 (0.578)	0.250*** (0.130)	0.966 (0.185)	0.885 (0.198)	0.451 (0.225)	1.024 (0.237)	0.711 (0.215)	0.723 (0.170)	0.394** (0.182)	0.922 (0.152)
partnership	0.643* (0.171)	0.773 (0.366)	0.330** (0.146)	0.678* (0.145)	0.690 (0.158)	1.045 (0.386)	0.953 (0.214)	0.647 (0.178)	0.834 (0.189)	0.427*** (0.121)	0.774* (0.107)
corporate not tax-exempt	0.734** (0.102)	0.588* (0.178)	0.712** (0.121)	0.896 (0.0936)	0.895 (0.113)	1.145 (0.244)	0.985 (0.127)	1.029 (0.138)	0.874 (0.109)	0.751* (0.113)	0.885 (0.0665)
corporate tax-exempt	0.294** (0.150)	0.314 (0.328)		0.104*** (0.0779)		0.659 (0.524)	0.153*** (0.111)	0.164*** (0.102)	1.452 (0.396)	0.593 (0.340)	0.343*** (0.124)
Government non-classified (omitted: no security reported)	1.476 (0.506)	0.867 (0.533)	1.454 (0.503)	1.089 (0.227)	1.138 (0.270)	1.487 (0.506)	1.122 (0.299)	0.910 (0.267)	1.145 (0.310)	0.957 (0.350)	1.440*** (0.203)
Government confidential	1.967 (1.450)		1.256 (1.537)	0.363 (0.291)	0.716 (0.597)	0.458 (0.463)	0.504 (0.375)	1.095 (0.702)	1.032 (0.557)		1.211 (0.370)
Government secret	2.090 (1.369)		2.428* (1.186)	0.979 (0.309)	1.284 (0.451)	0.209 (0.233)	1.245 (0.585)	1.452 (0.659)	1.142 (0.484)	0.802 (0.477)	1.911*** (0.377)
Government top secret			2.811 (3.064)	1.364 (0.853)	1.346 (0.631)	0.582 (0.655)	0.697 (0.524)	1.250 (1.008)	1.068 (0.592)	0.590 (0.573)	0.651 (0.255)
Constant	0.0246*** (0.0148)	0.0349*** (0.0228)	0.0564*** (0.0253)	0.0650*** (0.0185)	0.0322*** (0.0121)	0.0174*** (0.0125)	0.0309*** (0.0120)	0.0590*** (0.0209)	0.0463*** (0.0154)	0.0796*** (0.0348)	0.0411*** (0.00725)
No. Observations	2,166	722	1,317	3,568	2,618	1,312	4,020	2,596	5,446	1,502	7,319
pseudo R2	0.0952	0.0606	0.0929	0.0603	0.0873	0.0774	0.0380	0.0441	0.0439	0.0976	0.0657

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	326	327	331	332	333	334	335	336	337	339	423
SDB not 8(a)	0.882 (0.111)	0.839 (0.142)	0.703** (0.103)	0.773*** (0.0458)	0.804*** (0.0531)	0.781*** (0.0428)	0.798*** (0.0647)	0.841** (0.0638)	0.835 (0.0980)	0.740*** (0.0553)	0.836*** (0.0394)
8(a)	0.670 (0.228)	1.155 (0.409)	0.535 (0.211)	1.122 (0.137)	1.173 (0.152)	1.207** (0.113)	1.058 (0.152)	1.094 (0.164)	2.670*** (0.462)	1.131 (0.194)	1.598*** (0.139)
woman-owned	1.109 (0.0924)	0.896 (0.106)	0.978 (0.105)	0.930* (0.0380)	0.914** (0.0411)	0.963 (0.0381)	1.128** (0.0663)	1.002 (0.0531)	1.096 (0.0860)	0.837*** (0.0411)	0.832*** (0.0282)
minority-owned	0.790** (0.0923)	0.668** (0.112)	0.917 (0.122)	0.926 (0.0509)	0.859** (0.0513)	0.700*** (0.0333)	0.844** (0.0615)	0.902 (0.0613)	0.692*** (0.0762)	0.764*** (0.0505)	0.683*** (0.0292)
hubzone	0.996 (0.181)	0.827 (0.187)	0.774 (0.163)	0.974 (0.0754)	0.818** (0.0780)	0.990 (0.0949)	1.018 (0.127)	1.177* (0.115)	1.187 (0.189)	0.858 (0.108)	0.920 (0.0751)
service-disabled veteran	0.807 (0.147)	0.699 (0.159)	0.602** (0.141)	0.975 (0.0777)	0.811** (0.0713)	0.743*** (0.0520)	0.936 (0.0946)	0.840* (0.0813)	1.266* (0.168)	1.172* (0.104)	0.883** (0.0542)
other veteran	0.975 (0.111)	1.233 (0.192)	0.738** (0.111)	1.091* (0.0546)	1.006 (0.0545)	0.859*** (0.0432)	0.930 (0.0718)	0.907 (0.0579)	0.909 (0.112)	0.974 (0.0646)	0.860*** (0.0398)
log age	1.245*** (0.0532)	1.291*** (0.0718)	1.411*** (0.0752)	1.242*** (0.0241)	1.271*** (0.0261)	1.371*** (0.0259)	1.476*** (0.0436)	1.461*** (0.0364)	1.162*** (0.0474)	1.081*** (0.0243)	1.099*** (0.0165)
log employment	1.088*** (0.0345)	1.098** (0.0475)	0.978 (0.0375)	1.080*** (0.0160)	1.126*** (0.0170)	1.160*** (0.0148)	1.083*** (0.0225)	1.052*** (0.0182)	1.188*** (0.0374)	1.233*** (0.0218)	1.281*** (0.0152)
log receipts	1.036** (0.0168)	1.029 (0.0212)	1.039** (0.0185)	1.022*** (0.00666)	1.034*** (0.00702)	1.041*** (0.00594)	1.031*** (0.00956)	1.023*** (0.00772)	1.040** (0.0162)	1.041*** (0.00868)	1.021*** (0.00533)
sole proprietor (omitted: "other " orgs)	0.970 (0.171)	0.862 (0.200)	1.041 (0.197)	0.981 (0.0730)	0.858* (0.0738)	0.915 (0.0715)	1.147 (0.136)	0.849* (0.0839)	0.843 (0.138)	0.864 (0.0790)	1.068 (0.0676)
partnership	0.905 (0.137)	1.062 (0.223)	0.685* (0.147)	0.877* (0.0653)	0.868* (0.0663)	0.895* (0.0590)	0.833* (0.0891)	0.838** (0.0754)	1.029 (0.145)	0.896 (0.0729)	0.884** (0.0505)
corporate not tax-exempt	1.061 (0.0862)	1.163 (0.129)	0.878 (0.0872)	0.996 (0.0376)	0.940 (0.0364)	0.930** (0.0329)	0.969 (0.0535)	0.971 (0.0460)	1.022 (0.0812)	0.900** (0.0417)	0.967 (0.0301)
corporate tax-exempt	0.481** (0.172)		0.285** (0.150)	0.367*** (0.0709)	0.452*** (0.0823)	0.538*** (0.0941)	0.436*** (0.123)	0.434*** (0.0974)	0.225*** (0.121)	0.434*** (0.0769)	0.729** (0.0904)
Government non-classified (omitted: no security reported)	1.113 (0.174)	1.351 (0.300)	1.374* (0.247)	1.178** (0.0858)	0.918 (0.0748)	0.948 (0.0553)	1.064 (0.102)	0.790*** (0.0700)	1.117 (0.176)	1.137 (0.109)	1.025 (0.0655)
Government confidential	1.112 (0.321)	2.197** (0.770)	2.174*** (0.648)	1.788*** (0.225)	1.454*** (0.210)	1.197 (0.158)	1.868*** (0.348)	1.201 (0.182)	0.906 (0.320)	1.329 (0.262)	1.416** (0.203)
Government secret	1.204 (0.317)	1.058 (0.426)	1.222 (0.361)	1.392*** (0.156)	1.074 (0.120)	1.149** (0.0776)	1.196 (0.141)	0.741*** (0.0749)	0.941 (0.245)	0.972 (0.153)	1.257** (0.126)
Government top secret	1.076 (0.460)	1.212 (0.676)	0.602 (0.376)	0.790 (0.135)	0.724* (0.120)	0.826** (0.0642)	0.907 (0.152)	0.309*** (0.0517)	0.956 (0.286)	0.822 (0.178)	1.243** (0.125)
Constant	0.0607*** (0.0136)	0.0523*** (0.0150)	0.0746*** (0.0189)	0.103*** (0.00993)	0.104*** (0.0104)	0.103*** (0.00882)	0.0814*** (0.0112)	0.120*** (0.0138)	0.0724*** (0.0159)	0.121*** (0.0140)	0.0844*** (0.00644)
No. Observations	6,178	3,624	3,708	23,841	20,004	23,412	9,881	12,587	5,623	15,230	43,167
pseudo R2	0.0266	0.0407	0.0385	0.0221	0.0332	0.0534	0.0467	0.0442	0.0424	0.0401	0.0422

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	424	425	441	442	443	444	445	446	447	448	451
SDB not 8(a)	0.777** (0.0762)	0.498* (0.209)	0.811 (0.178)	0.953 (0.221)	0.802 (0.116)	0.642* (0.146)	0.842 (0.443)	0.470** (0.168)	0.995 (0.635)	0.735 (0.239)	0.924 (0.272)
8(a)	0.994 (0.215)		0.387 (0.403)	2.096** (0.784)	2.070** (0.426)	0.922 (0.390)	1.635 (1.348)			0.727 (0.509)	1.459 (1.195)
woman-owned	0.803*** (0.0564)	0.612 (0.187)	0.938 (0.128)	0.733** (0.116)	1.128 (0.117)	0.742** (0.104)	1.386 (0.415)	0.668** (0.134)	0.837 (0.419)	1.002 (0.236)	0.927 (0.175)
minority-owned	0.763*** (0.0639)	0.798 (0.280)	0.525*** (0.0973)	0.563*** (0.124)	0.743** (0.0923)	0.787 (0.159)	0.300*** (0.132)	0.805 (0.200)	0.616 (0.369)	0.697 (0.196)	0.553** (0.146)
hubzone	1.131 (0.175)	3.310** (1.765)	1.613 (0.491)	1.293 (0.422)	1.266 (0.325)	1.686** (0.409)		1.598 (0.820)		1.400 (0.736)	1.326 (0.730)
service-disabled veteran	0.815 (0.112)	0.303 (0.243)	0.433** (0.163)	0.732 (0.221)	0.757 (0.141)	0.971 (0.256)		1.038 (0.336)		1.221 (0.483)	0.744 (0.283)
other veteran	0.708*** (0.0765)	0.465 (0.251)	0.638** (0.119)	0.962 (0.234)	0.613*** (0.108)	0.654* (0.144)			0.902 (0.683)	0.827 (0.283)	0.727 (0.201)
log age	1.319*** (0.0429)	1.605*** (0.246)	1.121** (0.0571)	0.905 (0.0653)	1.118** (0.0597)	1.150** (0.0698)	1.231 (0.157)	1.051 (0.0999)	1.020 (0.177)	1.218* (0.129)	1.084 (0.0952)
log employment	1.255*** (0.0316)	1.196* (0.113)	1.057 (0.0422)	1.570*** (0.102)	1.322*** (0.0644)	1.289*** (0.0633)	0.918 (0.122)	1.127 (0.101)	1.222 (0.172)	1.203* (0.125)	1.423*** (0.101)
log receipts	1.040*** (0.0137)	1.008 (0.0415)	1.002 (0.0166)	0.984 (0.0231)	1.086*** (0.0342)	0.992 (0.0201)	1.125 (0.106)	1.090* (0.0530)	1.008 (0.0564)	1.110* (0.0665)	1.010 (0.0309)
sole proprietor (omitted: "other " orgs)	0.933 (0.130)	1.387 (0.675)	0.770 (0.169)	0.931 (0.293)	1.127 (0.240)	0.952 (0.240)	0.255** (0.165)	1.094 (0.334)	2.009 (1.620)	0.684 (0.286)	1.208 (0.356)
partnership	0.766** (0.0972)	1.290 (0.607)	1.058 (0.189)	1.076 (0.295)	1.181 (0.220)	0.881 (0.203)	0.349* (0.200)	0.498** (0.167)	0.514 (0.575)	0.669 (0.286)	0.914 (0.309)
corporate not tax-exempt	0.910 (0.0592)	0.792 (0.230)	0.899 (0.0953)	1.085 (0.165)	0.995 (0.103)	0.939 (0.114)	0.567** (0.156)	0.688** (0.127)	1.549 (0.719)	1.151 (0.261)	1.177 (0.223)
corporate tax-exempt	1.112 (0.210)	0.630 (0.733)	0.270** (0.163)	0.156* (0.160)	0.552 (0.281)	0.705 (0.345)	0.106** (0.111)	0.760 (0.389)		0.466 (0.360)	0.302** (0.162)
Government non-classified (omitted: no security reported)	0.834 (0.134)	0.886 (0.537)	0.726 (0.246)	1.536 (0.468)	1.166 (0.191)	1.032 (0.334)	2.291 (1.535)	2.198** (0.815)	3.993*** (1.370)	1.178 (0.429)	
Government confidential	0.746 (0.276)	3.059 (2.884)	0.839 (0.677)	1.275 (0.950)	0.961 (0.390)	1.169 (0.705)	4.204* (3.248)	1.127 (1.216)		0.724 (0.791)	
Government secret	1.489 (0.391)	3.496 (2.831)	1.638 (0.759)	1.247 (0.733)	1.486* (0.339)	1.597 (0.782)		0.658 (0.683)		2.653 (1.742)	0.318 (0.332)
Government top secret	1.355 (0.432)	0.938 (1.013)	0.541 (0.558)	2.651 (1.694)	1.842*** (0.339)	3.216** (1.660)		1.153 (1.174)		1.556 (1.587)	
Constant	0.0281*** (0.00518)	0.00877*** (0.00596)	0.108*** (0.0269)	0.0617*** (0.0219)	0.0182*** (0.00738)	0.0402*** (0.0121)	0.0319*** (0.0367)	0.0285*** (0.0155)	0.0454*** (0.0406)	0.0102*** (0.00744)	0.0372*** (0.0156)
No. Observations	13,306	2,344	4,989	3,250	5,401	5,678	797	2,404	442	1,554	2,343
pseudo R2	0.0765	0.0800	0.0203	0.0606	0.0719	0.0374	0.0966	0.0503	0.0330	0.0898	0.0611

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	452	453	454	481	483	484	485	488	492	493	511
SDB not 8(a)	0.944 (0.610)	0.833 (0.129)	1.046 (0.228)	0.466** (0.147)	1.042 (0.411)	0.983 (0.153)	0.692 (0.160)	0.501*** (0.109)	0.400*** (0.138)	0.705 (0.241)	0.734*** (0.0867)
8(a)	19.21*** (17.70)	1.513 (0.420)	0.848 (0.506)	1.188 (0.818)	1.646 (1.328)	4.800*** (0.981)	1.586 (0.665)	2.706*** (0.708)	0.888 (0.383)	1.506 (0.609)	1.615*** (0.255)
woman-owned	0.412* (0.194)	1.018 (0.106)	0.641** (0.116)	0.639** (0.122)	0.271*** (0.110)	0.857 (0.0957)	0.883 (0.157)	0.699*** (0.0956)	0.997 (0.223)	0.700* (0.151)	0.536*** (0.0428)
minority-owned	0.524 (0.308)	1.128 (0.150)	0.893 (0.182)	0.307*** (0.0862)	0.399** (0.154)	0.722** (0.105)	0.841 (0.156)	0.483*** (0.0851)	0.653* (0.168)	0.614 (0.190)	0.484*** (0.0475)
Hubzone		1.413 (0.329)	2.213** (0.743)	1.468 (0.660)	1.057 (0.599)	0.611** (0.135)	0.714 (0.400)	0.882 (0.236)	1.105 (0.641)	1.078 (0.436)	0.928 (0.229)
service-disabled veteran	1.270 (0.666)	1.039 (0.207)	1.410 (0.438)	0.520* (0.199)	0.365 (0.244)	1.059 (0.226)	1.858** (0.516)	0.846 (0.175)	1.216 (0.391)	0.971 (0.280)	0.625*** (0.0968)
other veteran	1.072 (0.561)	0.685** (0.123)	0.694 (0.179)	0.896 (0.184)	0.626 (0.255)	0.958 (0.164)	0.928 (0.217)	0.898 (0.150)	0.659 (0.261)	0.798 (0.259)	0.718*** (0.0846)
log age	1.221 (0.229)	1.062 (0.0534)	1.432*** (0.119)	2.044*** (0.193)	1.600*** (0.211)	1.295*** (0.0732)	1.593*** (0.137)	1.358*** (0.0801)	1.336** (0.162)	1.000 (0.0986)	1.264*** (0.0432)
log employment	1.126 (0.169)	1.239*** (0.0632)	1.240*** (0.0807)	0.880** (0.0516)	0.900 (0.0838)	1.198*** (0.0316)	1.153*** (0.0504)	1.064 (0.0407)	1.036 (0.0816)	1.074 (0.0623)	1.236*** (0.0289)
log receipts	1.030 (0.0722)	1.068** (0.0300)	1.095** (0.0504)	1.037 (0.0255)	1.016 (0.0337)	1.023 (0.0166)	1.032 (0.0259)	0.997 (0.0165)	1.058 (0.0418)	1.066* (0.0417)	1.056*** (0.0143)
sole proprietor (omitted: "other " orgs)	0.440 (0.368)	0.612** (0.130)	1.181 (0.371)	1.180 (0.327)	0.426* (0.207)	0.541*** (0.118)	0.775 (0.245)	1.130 (0.233)	1.000 (0.383)	1.629 (0.646)	0.726** (0.117)
Partnership	1.679 (1.176)	0.800 (0.158)	0.637 (0.225)	1.016 (0.296)	0.530 (0.218)	0.680* (0.135)	1.044 (0.308)	0.867 (0.194)	0.650 (0.315)	1.120 (0.349)	0.805* (0.0960)
corporate not tax-exempt	1.723 (0.742)	0.932 (0.101)	1.273 (0.200)	0.815 (0.136)	0.454*** (0.108)	0.709*** (0.0731)	0.945 (0.167)	0.973 (0.119)	0.849 (0.203)	0.867 (0.175)	1.002 (0.0670)
corporate tax-exempt	0.564 (0.667)	0.275*** (0.109)	0.321 (0.237)	0.138* (0.141)	0.195 (0.201)	0.352 (0.260)	0.0876*** (0.0469)	0.504 (0.239)	0.707 (0.555)	0.457 (0.337)	0.814 (0.108)
Government non-classified (omitted: no security reported)	0.586 (0.427)	1.334 (0.288)	0.656 (0.260)	0.550 (0.205)	1.091 (0.504)	1.403 (0.289)	1.507 (0.437)	0.790 (0.198)	0.480 (0.249)	1.062 (0.387)	0.846 (0.0913)
Government confidential	22.84** (30.22)	1.235 (0.573)	0.518 (0.517)			0.967 (0.543)	0.613 (0.604)	1.088 (0.521)	1.440 (1.155)	2.104 (1.320)	1.076 (0.293)
Government secret	2.042 (1.968)	1.049 (0.453)	0.674 (0.523)	0.663 (0.311)	1.119 (0.512)	1.051 (0.307)	0.499 (0.268)	1.384 (0.336)		1.279 (0.382)	0.792* (0.110)
Government top secret	1.078 (0.862)	1.294 (0.684)	1.854 (1.105)	0.205 (0.204)	2.318 (1.682)	0.801 (0.356)	0.715 (0.411)	0.702 (0.280)	1.081 (0.450)	1.138 (0.474)	0.920 (0.108)
Constant	0.0214*** (0.0235)	0.0255*** (0.00926)	0.00436*** (0.00277)	0.0521*** (0.0201)	0.0871*** (0.0442)	0.0239*** (0.00648)	0.0197*** (0.00790)	0.0356*** (0.00925)	0.0321*** (0.0175)	0.0154*** (0.00901)	0.0555*** (0.00995)
No. Observations	663	6,187	4,341	1,553	1,009	8,114	2,431	7,139	1,447	4,369	9,939
pseudo R2	0.117	0.0422	0.0990	0.135	0.0880	0.0530	0.0872	0.0445	0.0715	0.0227	0.0896

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	512	515	517	518	519	523	524	531	532	541	561
SDB not 8(a)	0.437** (0.144)	0.859 (0.259)	0.719** (0.107)	0.738 (0.153)	0.483** (0.137)	0.272* (0.206)	0.794 (0.345)	0.480*** (0.106)	0.549*** (0.0811)	0.644*** (0.0246)	0.700*** (0.0359)
8(a)	3.167*** (1.174)	1.241 (0.871)	1.506** (0.285)	1.916*** (0.415)	1.338 (0.419)	0.988 (1.153)	0.775 (0.856)	0.983 (0.461)	1.103 (0.254)	3.521*** (0.160)	3.241*** (0.194)
woman-owned	0.591*** (0.0991)	0.661* (0.151)	0.711*** (0.0822)	0.675** (0.103)	0.657*** (0.102)	1.412 (0.587)	0.173*** (0.0927)	1.340*** (0.126)	0.704*** (0.0726)	0.762*** (0.0184)	0.961 (0.0337)
minority-owned	0.462*** (0.114)	0.705 (0.160)	0.558*** (0.0726)	0.514*** (0.0890)	0.461*** (0.0994)	0.374** (0.187)	0.391** (0.150)	0.473*** (0.0718)	0.885 (0.110)	0.645*** (0.0200)	0.679*** (0.0290)
hubzone	0.317 (0.310)	1.546 (2.141)	1.273 (0.300)	1.219 (0.381)	0.500 (0.307)		2.678 (3.190)	1.099 (0.483)	1.013 (0.207)	0.889* (0.0606)	1.304*** (0.0962)
service-disabled veteran	1.163 (0.365)	0.178** (0.132)	0.684** (0.117)	0.588** (0.148)	0.511** (0.166)	0.537 (0.595)	0.620 (0.362)	0.467** (0.154)	0.848 (0.147)	0.737*** (0.0322)	1.018 (0.0582)
other veteran	0.694 (0.197)	0.425* (0.204)	0.945 (0.142)	0.965 (0.220)	0.349*** (0.128)	3.290** (1.529)	0.366 (0.271)	1.503*** (0.180)	0.666** (0.109)	0.685*** (0.0272)	0.848*** (0.0495)
log age	1.189* (0.105)	1.104 (0.113)	1.220*** (0.0607)	1.286*** (0.116)	1.247*** (0.0967)	1.731** (0.372)	1.556*** (0.226)	1.493*** (0.0542)	1.090* (0.0546)	1.218*** (0.0156)	1.315*** (0.0268)
log employment	1.082 (0.0566)	1.199*** (0.0707)	1.293*** (0.0462)	1.293*** (0.0595)	1.575*** (0.0843)	1.095 (0.123)	1.143* (0.0874)	0.861*** (0.0309)	1.239*** (0.0390)	1.236*** (0.00988)	1.145*** (0.0131)
log receipts	1.027 (0.0255)	0.939*** (0.0189)	1.056** (0.0230)	1.065* (0.0385)	1.005 (0.0227)	0.938 (0.0394)	0.937** (0.0300)	0.971*** (0.00923)	1.006 (0.0141)	1.021*** (0.00391)	0.993 (0.00497)
sole proprietor (omitted: "other " orgs)	1.490* (0.322)	3.933*** (1.136)	0.798 (0.202)	2.152*** (0.614)	2.211*** (0.518)	0.969 (0.652)	0.462 (0.303)	2.091*** (0.210)	0.695* (0.132)	1.534*** (0.0520)	1.608*** (0.0808)
partnership	1.240 (0.314)	0.658 (0.328)	1.018 (0.170)	1.292 (0.331)	0.450** (0.164)	0.692 (0.591)	1.242 (0.698)	0.282*** (0.0348)	0.552*** (0.103)	0.922* (0.0385)	0.940 (0.0645)
corporate not tax-exempt	0.962 (0.170)	0.815 (0.231)	0.796** (0.0776)	1.304* (0.193)	1.036 (0.159)	2.063 (0.983)	0.918 (0.320)	1.730*** (0.167)	0.899 (0.0837)	0.976 (0.0248)	0.950 (0.0394)
corporate tax-exempt	0.447* (0.194)	0.559 (0.237)	0.748 (0.199)	0.875 (0.414)	0.973 (0.225)	0.671 (0.730)	1.014 (0.881)	0.0467*** (0.0169)	0.312** (0.165)	0.831*** (0.0467)	0.383*** (0.0532)
Government non-classified (omitted: no security reported)	0.881 (0.265)	2.019** (0.656)	0.827 (0.143)	1.073 (0.215)	0.645 (0.173)	1.138 (0.908)	0.401 (0.414)	0.991 (0.249)	1.075 (0.196)	1.137*** (0.0454)	0.877** (0.0583)
Government confidential	0.524 (0.552)	4.120** (2.749)	1.120 (0.419)	0.646 (0.331)	0.678 (0.375)	1.110 (1.015)	1.897 (2.046)	0.830 (0.513)	0.628 (0.389)	1.294*** (0.119)	1.137 (0.144)
Government secret	0.517 (0.233)	0.742 (0.513)	0.904 (0.170)	0.553*** (0.142)	0.510** (0.167)	2.120 (2.397)	3.351* (2.118)	0.476 (0.344)	1.012 (0.296)	1.962*** (0.0802)	0.973 (0.0747)
Government top secret	0.875 (0.385)		0.710** (0.109)	0.649** (0.129)	0.257*** (0.0885)		1.350 (1.459)	0.744 (0.468)	0.786 (0.308)	1.871*** (0.0740)	0.586*** (0.0472)
Constant	0.0362*** (0.0130)	0.191*** (0.0711)	0.0268*** (0.00802)	0.00562*** (0.00270)	0.0187*** (0.00617)	0.0149*** (0.0117)	0.0470*** (0.0301)	0.0290*** (0.00425)	0.0786*** (0.0172)	0.0443*** (0.00240)	0.0530*** (0.00425)
No. Observations	4,140	1,123	6,709	8,641	6,512	1,067	1,442	24,161	7,078	109,839	46,520
pseudo R2	0.0480	0.138	0.0798	0.0689	0.139	0.128	0.130	0.120	0.0384	0.0568	0.0435

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	562	611	621	622	623	624	711	712	713	721	722
SDB not 8(a)	0.653*** (0.0698)	0.538*** (0.0506)	0.860 (0.118)	0.377*** (0.105)	0.348 (0.239)	0.555*** (0.121)	0.256*** (0.0700)	0.135* (0.140)	0.561 (0.239)	0.542*** (0.108)	0.949 (0.165)
8(a)	2.049*** (0.258)	1.740*** (0.212)	5.822*** (1.013)	1.719 (0.576)	0.707 (0.799)	1.722 (0.591)	0.987 (0.477)	3.160 (2.386)	2.110 (1.610)	0.562 (0.290)	1.418 (0.425)
woman-owned	0.872* (0.0666)	0.781*** (0.0390)	0.875* (0.0625)	0.412*** (0.0762)	0.536** (0.153)	1.177 (0.134)	0.564*** (0.0618)	0.763 (0.225)	0.611** (0.150)	0.842* (0.0877)	0.952 (0.111)
minority-owned	0.688*** (0.0653)	0.444*** (0.0302)	0.561*** (0.0512)	0.873 (0.176)	0.653 (0.182)	0.549*** (0.0760)	0.877 (0.112)	0.754 (0.296)	0.529** (0.160)	0.888 (0.0745)	0.545*** (0.0731)
hubzone	0.740** (0.0973)	0.960 (0.185)	1.411 (0.367)	0.366* (0.193)		0.357 (0.256)	0.475 (0.493)	1.450 (1.060)	0.320 (0.297)	1.070 (0.662)	1.017 (0.343)
service-disabled veteran	0.743*** (0.0910)	0.837** (0.0736)	1.119 (0.153)	0.792 (0.202)	0.351 (0.365)	1.165 (0.280)	0.558* (0.173)		0.481 (0.225)	0.679 (0.202)	0.187*** (0.0790)
other veteran	0.960 (0.117)	1.049 (0.0751)	0.943 (0.102)	0.909 (0.222)	2.044* (0.778)	0.760 (0.185)	1.039 (0.187)	0.860 (0.461)	0.668 (0.261)	0.974 (0.161)	0.887 (0.192)
log age	1.342*** (0.0583)	1.364*** (0.0363)	1.141*** (0.0385)	1.359*** (0.106)	1.152* (0.0841)	1.176*** (0.0687)	1.162*** (0.0617)	0.875 (0.110)	1.105 (0.110)	0.995 (0.0358)	1.331*** (0.0789)
log employment	1.145*** (0.0305)	0.944*** (0.0198)	0.990 (0.0211)	0.928* (0.0408)	1.431*** (0.0591)	0.983 (0.0444)	1.100** (0.0407)	1.077 (0.120)	1.119** (0.0636)	1.176*** (0.0257)	0.999 (0.0358)
log receipts	0.996 (0.0112)	0.995 (0.00657)	1.018* (0.00954)	1.039** (0.0198)	1.044* (0.0271)	1.027 (0.0173)	0.948*** (0.0118)	0.970 (0.0352)	1.007 (0.0252)	0.998 (0.00909)	0.998 (0.0161)
sole proprietor (omitted: "other " orgs)	1.227* (0.148)	2.092*** (0.140)	1.058 (0.102)	0.544** (0.147)	2.738** (1.236)	1.883*** (0.307)	1.954*** (0.302)	1.771 (0.807)	1.272 (0.373)	2.590*** (0.315)	1.514** (0.251)
partnership	0.960 (0.120)	1.074 (0.106)	0.923 (0.113)	0.695 (0.202)	0.928 (0.180)	0.710 (0.184)	0.733 (0.199)	0.442 (0.480)	1.162 (0.375)	0.996 (0.0885)	0.803 (0.145)
corporate not tax-exempt	0.875* (0.0645)	1.041 (0.0662)	0.879 (0.0731)	1.128 (0.187)	1.009 (0.178)	0.943 (0.149)	0.764 (0.145)	1.393 (0.563)	0.893 (0.211)	0.920 (0.0784)	0.846 (0.111)
corporate tax-exempt	0.304*** (0.116)	0.538*** (0.0466)	0.329*** (0.0418)	0.188*** (0.0458)	0.377*** (0.0686)	0.268*** (0.0424)	0.277*** (0.0731)	0.997 (0.412)	0.567* (0.178)	0.773 (0.151)	0.271*** (0.0862)
Government non-classified (omitted: no security reported)	0.691** (0.110)	0.947 (0.0850)	0.942 (0.156)	1.269 (0.406)	1.624 (0.657)	0.552 (0.200)	1.030 (0.265)		0.605 (0.378)	0.617* (0.161)	0.507* (0.180)
Government confidential	1.339 (0.361)	0.718 (0.181)	0.727 (0.249)	0.256 (0.247)		1.798 (0.746)	1.597 (0.865)		7.929*** (4.923)	0.970 (0.561)	0.873 (0.691)
Government secret	0.482*** (0.135)	0.975 (0.112)	0.874 (0.197)	0.327*** (0.157)		1.265 (0.488)	0.430 (0.258)	2.276 (2.029)	1.039 (0.809)	1.168 (0.594)	1.149 (0.459)
Government top secret	0.467** (0.148)	0.884 (0.0998)	0.491** (0.175)	0.169** (0.124)		0.807 (0.510)	1.119 (0.611)		3.787* (2.958)	0.798 (0.615)	
Constant	0.0662*** (0.0113)	0.0636*** (0.00658)	0.0897*** (0.0125)	0.234*** (0.0729)	0.0147*** (0.00619)	0.0276*** (0.00688)	0.118*** (0.0243)	0.0918*** (0.0556)	0.0667*** (0.0262)	0.168*** (0.0269)	0.141*** (0.0373)
No. Observations	10,702	28,911	13,624	1,420	3,849	14,706	5,880	1,467	2,023	6,150	3,198
pseudo R2	0.0395	0.0624	0.0333	0.105	0.115	0.0661	0.0828	0.0376	0.0476	0.0263	0.0534

Robust standard errors in parentheses

Table 5: Industry-Specific Regression Results

	811	812	813
SDB not 8(a)	0.751*** (0.0564)	0.475*** (0.110)	0.531** (0.133)
8(a)	1.457*** (0.179)	0.666 (0.327)	1.137 (0.643)
woman-owned	0.912* (0.0484)	0.577*** (0.0868)	0.455*** (0.0692)
minority-owned	0.634*** (0.0410)	0.583*** (0.101)	0.767* (0.105)
hubzone	0.829 (0.116)	1.966** (0.657)	0.883 (0.700)
service-disabled veteran	0.939 (0.0860)	0.966 (0.227)	1.354 (0.340)
other veteran	1.039 (0.0658)	0.886 (0.194)	0.701 (0.164)
log age	1.187*** (0.0290)	1.133** (0.0700)	1.532*** (0.0734)
log employment	1.178*** (0.0202)	1.215*** (0.0492)	1.033 (0.0338)
log receipts	1.002 (0.00716)	0.990 (0.0175)	0.994 (0.0125)
sole proprietor (omitted: "other " orgs)	0.834** (0.0654)	1.333 (0.266)	4.316*** (0.673)
partnership	0.860* (0.0777)	1.079 (0.247)	0.833 (0.303)
corporate not tax-exempt	0.997 (0.0503)	1.066 (0.164)	0.769 (0.141)
corporate tax-exempt	0.776 (0.159)	0.0822*** (0.0595)	0.549*** (0.0711)
Government non-classified (omitted: no security reported)	1.156 (0.104)	1.188 (0.331)	1.680** (0.415)
Government confidential	0.957 (0.215)	1.091 (0.713)	0.981 (0.571)
Government secret	1.065 (0.134)	0.887 (0.432)	0.850 (0.470)
Government top secret	0.641*** (0.0994)	0.923 (0.497)	0.872 (0.477)
Constant	0.0838*** (0.00913)	0.0758*** (0.0213)	0.0297*** (0.00660)
No. Observations	21,820	3,877	9,378
pseudo R2	0.0265	0.0690	0.0760
Robust standard errors in parentheses			

Table 6
NAICS Codes Referenced in Table 4

111 – Crop Production
112 – Animal Production
113 – Forestry and Logging
114 – Fishing, Hunting and Trapping
115 – Support Activities for Agriculture and Forestry
211 – Oil and Gas Extraction
212 – Mining (except Oil and Gas)
213 – Support Activities for Mining
236 – Construction of Buildings
237 – Heavy and Civil Engineering Construction
238 – Specialty Trade Contractors
311 – Food Manufacturing
312 – Beverage and Tobacco Product Manufacturing
313 – Textile Mills
314 – Textile Product Mills
315 – Apparel Manufacturing
316 – Leather and Allied Product Manufacturing
321 – Wood Product Manufacturing
322 – Paper Manufacturing
323 – Printing and Related Support Activities
324 – Petroleum and Coal Products Manufacturing
325 – Chemical Manufacturing
326 – Plastics and Rubber Products Manufacturing
327 – Nonmetallic Mineral Product Manufacturing
331 – Primary Metal Manufacturing
332 – Fabricated Metal Product Manufacturing
333 – Machinery Manufacturing
334 – Computer and Electronic Product Manufacturing
335 – Electrical Equipment, Appliance and Component Manufacturing
336 – Transportation Equipment Manufacturing
337 – Furniture and Related Product Manufacturing
339 – Miscellaneous Manufacturing
423 – Merchant Wholesalers, Durable Goods
424 – Merchant Wholesalers, Nondurable Goods
425 – Wholesale Electronic Markets and Agents and Brokers
441 – Motor Vehicle and Parts Dealers
442 – Furniture and Home Furnishings Stores
443 – Electronics and Appliance Stores

Table 6
NAICS Codes Referenced in Table 4

444 – Building Material and Garden Equipment and Supplies Dealers
445 – Food and Beverage Stores
446 – Health and Personal Care Stores
447 – Gasoline Stations
448 – Clothing and Clothing Accessories Stores
451 – Sporting Good, Hobby, Book and Music Stores
452 – General Merchandise Stores
453 – Miscellaneous Store Retailers
454 – Nonstore Retailers
481 – Air Transportation
483 – Water Transportation
484 – Truck Transportation
485 – Transit and Ground Passenger Transportation
488 – Support Activities for Transportation
492 – Couriers and Messengers
493 – Warehousing and Storage
511 – Publishing Industries (except Internet)
512 – Motion Picture and Sound Recording Industries
515 – Broadcasting (except Internet)
517 – Telecommunications
518 – Data Processing, Hosting, and Related Services
519 – Other Information Services
523 – Financial Investments and Related Activities
524 – Insurance Carriers and Related Activities
531 – Real Estate
532 – Rental and Leasing Services
541 – Professional, Scientific and Technical Services
561 – Administrative and Support Services
562 – Waste Management and Remediation Services
611 – Educational Services
621 – Ambulatory Health Care Services
622 – Hospitals
623 – Nursing and Residential Care Facilities
624 – Social Assistance
711 – Performing Arts, Spectator Sports and Related Industries
712 – Museums, Historical Sites and Similar Institutions
713 – Amusement, Gambling and Recreation Industries
721 – Accommodation
722 – Food Services and Drinking Places

Table 6
NAICS Codes Referenced in Table 4

811 – Repair and Maintenance

812 – Personal and Laundry Services

813 – Religious, Grantmaking, Civic, Professional and Similar Organizations